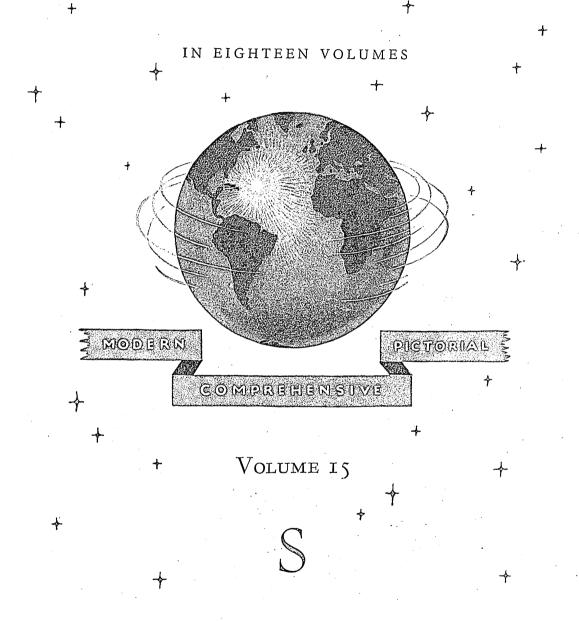
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VOLUME FIFTEEN

S is the nineteenth letter in the English alphabet. The Phoenician letter from which it was derived was shaped much like a capital W, and was called *shin*, which meant *tooth*. Doubtless it was intended to represent two teeth, though it looks like those of a saw



rather than those of a human being. The Greeks turned the letter on its side, and called it sigma, and the Romans, when they adopted it, gradually dropped the

lowest line and rounded it into the form of modern capital S.

The letter has had in all these languages about the same sound, though it is probable that, in the Phoenician, it had rather more of the *sh* value than is common today. In English, *s* has four sounds: the proper *s*, or "hissing" sound, as in *sit*; the z, or "buzzing" sound, as in *music*; the *sh* sound, as in *sure*, which is uncommon except before *i* in such words as *mansion*; and the zh sound, as in *decision*. S is also used with h in a very common digraph, or letter combination.

SAALE RIVER. See GERMANY (Rivers and Lakes).

SAAR, zahr, TERRITORY, OR SAAR VALLEY, also called SAAR BASIN, a district on the Franco-German border, whose people are chiefly German. In a plebiscite held under the auspices of the League of Nations on January 13, 1935, the Saarlanders voted by a large majority to return to Germany. The area of the Saar is 738 square miles; the population, 863,736 (1939). It has immense coal deposits.

Under Section IV of the Treaty of Versailles, Germany ceded to France full possession of the coal deposits and mines in the Saar territory, whose borders were defined in the treaty. This was in compensation for the German destruction of French coal mines during World War I, and part payment toward the total reparations. It was of inestimable value to France, for it provided the coal required by the iron deposits of Lorraine.

A governing commission of five, including one Frenchman, one German inhabitant of the Saar, and three of other nationalities, exercised the authority of the League. After years of earnest protest over foreign occupation, Germany succeeded in 1930 in having allied control ended, by order of the League. After the plebiscite in 1935 the League Council awarded the Saar Territory to Germany under the conditions of the Versailles Treaty (which see). See Germany (map: Saarland).

SABATIER, PAUL. See Francis of Assisi. SABATINI, sab ah te' ne, RAFAEL (1875-

), an Italian author who writes romances in English. Jesi, a small Italian village, was his birthplace. Crumbling palaces, an ancient

cathedral, and narrow, cobblestone streets made vivid a glamorous past and aroused the boy's interest in history. Although his mother was an Englishwoman, she had lived in Italy since her girlhood, and taught her young son only a few English phrases. At school, in Switzerland and Portugal, he learned to speak and write five languages fluently, but it was



Photo: U &

RAFAEL SABATINI

not until he was eighteen that he began to acquire a knowledge of English. His father sent him to England, "dedicated to commerce," and for nine years Sabatini devoted himself to business interests. He married an Englishwoman and became a British subject.

The Suitors of Yvonne, a rather mediocre historical novel, appeared in 1902. The young author Sabatini was not discouraged, but

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conscientiously turned out a novel a year that no one read. He made a painstaking study of the history of every period he described, and his careful research was rewarded by the impression of reality in his novels. From the obscurity of the unknown and unread author, Sabatini leaped into astonishing fame and popularity in 1921. Breathless, young and old were following the adventures of an impudent, picturesque rogue, one Scaramouche. The reading public discovered a love for romance and a thrill from a gallant speech, a courageous lover, a daredevil escape, and the click of swords. Since the publication of Scaramouche, many of Sabatini's earlier novels have been rescued from neglect, and with his later works, have become best sellers.

Sabatini's Books. The volumes most widely read among English-speaking people are Scaramouche and The Sea Hawk, which were successfully arranged for moving pictures. Other books are The Life of Cesare Borgia, The Lion's Skin, The Justice of the Duke, Torquemada and the Spanish Inquisition, The Gates of Doom, The Snare, Captain Blood, Fortune's Fool, Bardelys the Magnificent (with Hamilton), The Fugivives, The Rattlesnake (with Terry), Mistress Wilding, The Black Swan, and Gallants Stand Up.

SABBATH, sab' ath, the rest day of the Jews, observed on the seventh day of the week. In ancient Hebrew history, it was a joyous, holy day on which the people ceased from toil, visited the sanctuary, and offered a double number of sacrifices. The Sabbath was in existence from the earliest times, but was first ritualized by Moses, who made the duty of its observance the subject of one of the Ten Commandments. Such a rest day is first mentioned in Exodus; it was also observed by the Assyrians and Babylonians.

After the Babylonian exile, Sabbath observance became very rigid, and the Jews suffered many losses and indignities at the hands of their enemies rather than break the Sabbath laws. In the oral law, twenty-nine major and minor kinds of labor were forbidden. Bearing burdens, lighting fires, and traveling more than a Sabbath day's journey (less than a mile) were not allowed. The attitude of Jesus in regard to these regulations is summarized in the statements-"It is lawful to do well on the Sabbath day," and "The Sabbath was made for man, and not man for the Sabbath." Except in the Gospels, the Sabbath is rarely mentioned in the New Testament writings. There is reference, however, to the first day of the week (now called Sunday; by some, Lord's Day) observed in commemoration of the Resurrection of Jesus.

Observance of Sunday as a holy day has become practically universal in the Christian Church, though the Seventh-Day Adventists (which see), as well as Orthodox Jews, recognize Saturday as the Sabbath. In A.D. 321, the Emperor Constantine made a Sabbatical rest on Sunday obligatory for those living in Farmers were exempt. In various localities in America, there are special laws regulating Sunday work or amusements. See SUNDAY.

SABBATH DAY'S JOURNEY. See SAB-BATH, above.

SABINE PASS, located in southeastern Texas, connects the Sabine and Neches rivers with the Gulf of Mexico. See below.

SABINE, sa been', RIVER, a stream which rises in Hunt County, in northeastern Texas, flows southeast for 250 miles, and then south on the lower half of the boundary between Texas and Louisiana, through Sabine Lake and Sabine Pass into the Gulf of Mexico. entire length is 500 miles, and its drainage area, 20,440 square miles. The Sabine is navigable, large ocean-going steamers entering Sabine Pass and plying as far up the river as Orange, Tex., a lumbering center, the principal town on the banks. On the western shore of Sabine Lake, in Texas, are the towns of Sabine and Port Arthur. See Louisiana and Texas (colored maps).

SABINES, sa' binez, an Italian people whose daughters were seized and carried off by the early Roman youths, while they were all being entertained at a great festival. According to the legend, after Romulus had built Rome, he found that there were few women among the inhabitants; therefore he sent embassies to the neighboring cities to ask that his people might take wives from among them. When his request was refused, he planned to invite all the surrounding people to an elaborate entertainment. In the midst of the games, the Romans violated the laws of hospitality by seizing the young women. After the war spirit of the Sabines had cooled, the two nations were combined as one, the Sabines settling on Quirinal Hill. (See next page; also, page 6174.)

Related Subjects. The article Romulus presents additional details. For another story of the Sabines, see Tarpeian Rock. See also illustration, page 6174.

SABLE, sa' b'l, a small mammal belonging to the fur-bearing group of animals, the weasel family, and having the most valuable pelt of them all. It is native to Siberia and is closely related to the North American pine marten, or American sable, as the latter is sometimes called (see illustration, under Marten). The sable is usually not over a foot and a half in length. Its fur, which covers even the feet and soles, is a lustrous dark brown, with grayish-yellow spots on the sides of the neck. It does not change to white in winter, as is true of some furs. In European countries, sable is used in the robes of sovereigns and state dignitaries; a coat of this fur owned by Nicholas II, former czar of Russia, is said to have been worth \$22,000.



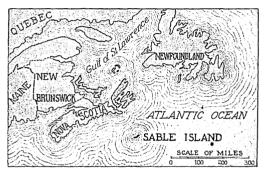


THE ABDUCTION OF THE SABINE WOMEN

The animal is somewhat difficult to capture, and is caught in traps especially designed to prevent injury to the fur. The fur of the muskrat and that of the hare are dyed and sold as imitation sable. For habits of the animal, see Marten. See, also, Fur and Fur TRADE; WEASEL.

Scientific Name. The Siberian sable belongs to the family Mustelidae. Its scientific name is Mustela

SABLE ISLAND, for years called the "Graveyard of the Atlantic," and known to early navigators as Santa Cruz, or "Holy Cross," is a low, sandy island about one hundred miles off the southern coast of Nova



LOCATION OF SABLE ISLAND

Scotia. It is on the northern lane of travel between Europe and America, and over 200 wrecks have occurred near the treacherous Cape Sable, which juts out into the Atlantic at the

southern extremity of the island.

Sable Island is crescent-shaped, about twenty miles long and one mile broad, and is gradually sinking, for in 1802 it was twice its present length, and two and a half times wider. The Canadian government has caused thousands of trees to be planted on the island, to bind more solidly the shifting sandy soil, and to make the island more easily visible to ships. Canadian government also maintains there a life-saving station, a wireless-telegraph station, and a lighthouse. Of the three lighthouses built there since 1873, two have been washed away. To-day, regular Coast Guard patrols in the vicinity lessen the hazards of travel. Cranberries grow in large quantities, and the island supports a hardy breed of ponies, supposed descendants of the horses left on the shores by the Portuguese in the sixteenth century.

SABOT, sah bo', a wooden shoe. See Boots AND SHOES.

SABOTAGE, sab o tazh', a practice adopted during the nineteenth century by French workmen who brought production to a standstill by casting their sabots into the machines. In this early struggle between capital and labor the term meant rendering little service for wages paid, doing poorly the work assigned, or using poor material where better quality was ordered. thus injuring the value and reputation of manu-

factured goods.

When it became clear that such tactics were more extreme measures were ineffective. employed; and to-day sabotage has reached the point in practice where it may be defined as malicious waste or destruction of the property of an employer. In the lumber industry, for instance, it may mean cutting logs shorter than the required length, or sawing boards thinner than ordered; it may mean driving spikes into logs so that saws will be ruined. In a machine shop, it may mean putting sand or iron filings into oil cups or gearings, loosening bolts, or purposely mislaying tools to cause In building construction, it may mean weak mixture of mortar or waste of material; in street paving, instability of foundation or poorly prepared material. In any trade or occupation, it may mean "lying down on the job"—accomplishing so little that the employer suffers loss.

It is obviously not to the advantage of those who practice sabotage to destroy machinery. or even to damage it very seriously, for such maliciousness may involve a loss of wages until repairs can be made. But everything which will irritate and embarrass the employer and diminish production is done, secretly, of course. That some of the acts resorted to are criminal does not deter the guilty person, for detection

is usually difficult.

In time of war, specially trained saboteurs can greatly hamper the war effort by destroying vital plants engaged in producing weapons and supplies needed by the army, and by blowing up important bridges, reservoirs, and power plants. In 1940, the Congress of the United States so amended the Espionage Act of 1017 that sabotage was made a Federal offense. See UNITED STATES IN WORLD WAR II (Rounding up Spies and Saboteurs). E.J. SAC, sak, OR SAUK, sawk. See Indians,

AMERICAN (Most Important Tribes). SACAJAWEA, sak ah jaw' we ah, an Indian

woman who achieved fame with the Lewis and Clark Expedition (which see). See, also, NORTH DAKOTA (History); PORTLAND, ORE.

SACCHARIMETER, sak ah rim' e tur. See Polariscope; Polarization of Light.

SACCHARIN, sak' ah rin, a white, odorless powder, a product of coal tar, which, when pure, is several hundred times sweeter than cane sugar. It was discovered in 1879 by Dr. Constantin Fahlberg, of Germany, and Ira Remsen, a noted American chemist, and was later patented in Europe and in the United States. It is sold usually in tablet form. Saccharin dissolves very little in cold water, somewhat more in hot, and is thoroughly soluble in alcohol. A half-grain tablet takes the place of the average

amount of sugar used in sweetening a cup of coffee. Although saccharin is so much sweeter than sugar, it is in no sense a sugar substitute, because it has no food value. When used in a food for sweetening purposes, it replaces a definite amount of sugar, and correspondingly reduces the nutritive value of the product.

The United States Department of Agriculture regards saccharin as a drug, since it is sometimes prescribed by physicians for use in

diseases where sugar is harmful. According to the provisions of the pure-food law, its use in candy, sodafountain drinks, or any other food preparations not intended for diseased persons is an adulteration. See SORGHUM. E.V.M'C.

SACHS, zahks, HANS(1494-1576), a German poet, the most famous of the mastersingers. He was born in Nuremberg, learned the trade of shoemaking, and spent several years traveling

about the country as a journeyman shoemaker. He had received a good education and followed this with instruction in the art of the mastersingers, so that his songs, fables, and dramas soon became famous. In 1516 he settled in Nuremberg, where he remained for the rest of The doctrines of Luther interested his life. him greatly, and he wrote in support of the Reformation, always contending for peace and moderation. The works of Sachs are not only better, but more numerous, than those of any other mastersinger. Altogether, including tales and fables in verse, dramas, hymns, and songs, he left not fewer than 6,300 pieces. These show humor as well as sentiment, and though the author had always some didactic purpose in mind, it is not unpleasantly apparent. See Mastersingers.

SACO RIVER, rising in northwestern New Hampshire, flows southward across Maine and empties into the Atlantic Ocean.

SACRAMENT, in the Christian Church, a solemn observance instituted for the spiritual benefit of the participants. In the Eastern and Roman Catholic Churches, there are seven sacraments—Baptism, Confirmation, Holy Eucharist, Penance, Extreme Unction, Holy Orders, and Matrimony. Most Protestant

Churches recognize only two—Baptism and the Eucharist, or the Lord's Supper. Quakers reject all outward forms, but practice spiritual sacraments. As to the meaning of the sacraments, Roman Catholics consider them effective, in themselves, for salvation. Most protestant Churches regard them as visible signs of a covenant between God and the individual. See the article ROMAN CATHOLIC CHURCH.

SACRAMENTO, sak rah men' toh, CALIF.,

the capital of the state and county seat of Sacramento County, is situated on the Sacramento River, at the center of California's great inland valley, seventy-five miles by airline northeast of San Francisco. One of the largest interior cities of the Pacific states, it is the industrial, financial, shipping, and trading center of the interior agricultural valley, and of the great mining and timber region of northern Califor-Population, nia.



Photo: Visual Education Service

CALIFORNIA FAN PALMS

Along a street in Sacramento. The dome of the state capitol is seen in the background.

105,958 (Federal census of 1940).

Transportation. The city is served by the Southern Pacific, the Western Pacific, the Santa Fe, and the Great Northern railroads, and by a network of connecting steam, interurban electric, and motorbus lines. The main trunk lines of the state highway system center here, and water transportation is afforded by the Sacramento River. This stream is navigable for 100 miles above Sacramento, and is plied by passenger and freight steamers. Sacramento is an important aviation center, with Mather Field, one of the Government's large Western training fields, and a modern municipal airport. McClellan Field, also located here, is the Air Corps West Coast Supply and Repair Depot.

Industry. The city's industrial establishments have been built primarily for the conversion of the raw products of the region into marketable commodities, and include large fruit and vegetable canneries; slaughtering and meat-packing establishments; rice cleaning and polishing plants; flour and feed mills; cream, butter, and ice-cream factories; the only plant in the world for shelling and processing almonds; box factories; the largest Western plant of the American Can Company; and kindred institutions. The Southern Pacific shops, second largest in the world, and the shops of the Western Pacific are also in Sacramento.

Institutions. Educational and benevolent institutions include the Junior College, Christian Brothers' College, Saint Joseph's Academy, the Stanford Home, Sacramento Orphanage and Children's Home, and Saint Patrick's Orphanage. Among the public buildings are the State Capitol buildings, the municipal auditorium, the State Fair buildings, the Junior College Stadium, seating 25,000, and historic Sutter Fort, now completely restored and maintained as a state museum housing an invaluable collection of relics of the "Days of '49."

History. Sacramento is one of the West's historic cities. It was founded in 1839 by Captain John A. Sutter, on a grant obtained from the Mexican government, as the first outpost of white civilization in interior California. The settlement which grew up about Sutter's Fort was first called New Helvetia; its name was changed to Sacramento when the city was formally platted in 1848. Sacramento was incorporated by act of the first California legislature, in 1850, was selected for the meeting of the state legislature, in 1852, and in 1854 was made the permanent state capital.

Sutter's Fort was the western destination of the overland emigrant trains of the early pioneers, and reached its greatest fame as the center of mining activities in the great gold rush following the discovery of gold by James W. Marshall, one of Sutter's men, January 24, 1848. The first transcontinental railroad—the old Central Pacific, now Southern Pacific—promoted by Sacramento men and capital, was started from this city in 1863, and completed in 1867.

SACRAMENTO RIVER, the largest waterway in California, drains a fertile valley in the northern half of the state. It rises near the slope of beautiful Mount Shasta and flows south into Suisun Bay, on the boundary between Contra Costa and Solano counties. Sacramento is about 400 miles long, and its drainage basin has an area of 27,100 square miles. It is navigable for small boats to Red Bluff, about 250 miles above its mouth, and for larger vessels to the city of Sacramento. The principal tributaries are the Pit, Feather, and American, and of the numerous streams which join it from the Sierra Nevadas and the Coast Range, many pass through a gold-mining country. In 1938, construction of Shasta Dam and Reservoir on the Sacramento River was begun. This is part of the Central Valley Water Project, the purpose of which is flood control, irrigation, and power. Four bridges across the river take care of the traffic directed around the Reservoir. See California (Memorable California Events; Rivers; Transportation); DAM; and SHASTA, MOUNT.

SACRED COLLEGE, the entire body of cardinals, who are appointed by the Pope and share with him in the government of the Roman Catholic Church. In dignity and influence, they are second only to the Pontiff himself. Their number has varied from time to time, present usage fixing it at seventy. Generally

speaking, their duties consist in administering the affairs of the Church, under the direction of the Pope. The greatest responsibility of the Sacred College, however, falls upon its members on the death of a Pontiff, when they assemble to elect his successor. In order to hasten their agreement, as well as to protect them from outside influences, they are subjected to strict discipline during this period; the ceremony befitting their rank is foregone, and they are debarred from intercourse with the public.

F.A.P.

Related Subjects. For a discussion of the office of cardinal, and a list of American members of the Sacred College, see the article CARDINAL; for the method of election of the Popes, see POPE.

SACRED GATE. See ATHENS, diagram of ancient city.

SACRED GEESE. See GOOSE (In History and Literature).

SACRED WAY, one of the famous streets of ancient Rome. It is still preserved in the modern city, where Mussolini is restoring antiquities. See ROME (How the City Looked).

SACRIFICE, an offering to God for the purpose of communion, thanksgiving, or means of atonement for sin, based on the idea that worship should consist not merely in words, but also in the giving of something dear to the worshiper. Among primitive peoples, it was believed that a kinship existed between them and their gods. Certain animals also were supposed to be related to the tribal gods; hence they were considered sacred, and were not to be slaughtered for private use. The meal that followed the religious act of sacrifice presupposed the establishment of a bond between the worshipers and their gods because of the supposed relationship between the worshipers, their gods, and the sacred animals thus sacrificed.

Two types of sacrifices were offered by the Jews, bloody and unbloody; that is, animals and fruits of the land. The bloody offerings were the burnt offering, a lamb, male and without blemish, offered twice daily by the priests in the name of the nation; the peace offering, a lamb or goat, male or female, without blemish, offered by families at new moons or on special occasions of thanksgiving, a part of which they ate according to prescribed rites; and the guilt offering, made by individuals for cleansing from sin, and, once a year, on the Day of Atonement, by the priest for the sins of the nation. Unbloody, or fruit offerings, were offerings, made on various occasions, of ears of corn, oil, incense, fine flour, or unleavened cakes.

In the New Testament, the sacrifice of Christ on the Cross, the innocent for the guilty, becomes the fulfillment of all former sacrifices: "For this He did, once, when He offered up Himself" (see *Hebrews* VII, 27).

SACRUM, sa' krum. See PELVIS.

SADDUCEES, sad' u seez, a religious sect active in Judea at the time of Christ, which had its origin among the aristocracy. Its members held many of the highest offices, and in contrast to the Pharisees, who kept themselves strictly from the world, they showed a strong inclination toward other than Jewish customs, valuing social standing, culture, and wealth. They were given to political intrigue, stirring up rebellion and organizing small armies against the Romans, and keeping Judea in a state of unrest for over twenty years. The Sadducees and the Pharisees hated each other.

Josephus, the Jewish historian, states that the Sadducees "had only the rich on their side but not the common people." In belief, the Sadducees held to the written law of Moses, but denied the teaching of the Pharisees regarding the binding power of the oral law, the resurrection of the dead, and the current doctrine of angels. They also affirmed the freedom of the will. After the fall of Jerusalem, in A.D. 70, the sect of the Sadducees disappeared.

See PHARISEES.

SADI, sah' de, or saw' de (about 1184-1292), a great Persian poet, born at Shiraz. Under the protection of his patron, the Prince of Fars, he studied philosophy in Baghdad, and while there won fame by his writings. His patron was deposed by the Mongols in 1226, and Sadi, in discouragement, entered upon a period of wandering which continued for thirty years. After living for a considerable time in Damascus, he went to Jerusalem, where he dwelt as a hermit until captured by some Frankish crusaders and taken as a slave to Tripoli. Rescued by a wealthy friend, he returned at length to his home, where he spent his remaining years quietly.

His most important works, both of which were written near the end of his life, are the Bustan, or Fruit-Garden, and the Gulistan, or Rose-Garden, the former in verse, the latter in prose. Both are made up of discussions of philosophic and religious questions, interspersed with interesting tales and clever savings. His work in lyric poetry was copious, though to many critics it does not have the quality of his other work. His was the first Persian literature to be introduced into Europe, and in 1634 Du Ryer translated it into the French. At later dates, the collected works of Sadi were translated into English by Ross, Eastwick, and Arnold, and into German by other scholars. See Persia.

SADOWA, BATTLE OF. See SEVEN WEEKS' WAR.

SAEIMA, the legislative body in Latvia until 1934. See Latvia (Government).

S. A. E. RATING. See Horse Power. SAETERS. See Norway (Livestock).

SAFETY. A glance at statistics convinces one that the prevention of accidents has become

a great national problem. According to the figures presented by the National Safety Council, in 1940, nearly 9,100,000 persons in the United States were injured. This is typical of all recent years as far as accidents are concerned. There were 96,500 accidental deaths, a 4.4 per cent increase over 1939.

In World War I, 50,510 American soldiers were killed. Since that time, almost twice that many persons have been killed by accident

annually in the United States.

The economic cost of accidents is tremendous. It is estimated that loss to the nation in 1940 from this cause was \$3,500,000,000. In 1939, the figure was \$3,300,000,000, an average of \$115 for every family. It is more than the entire annual cost of public education in the United States.

Accidents occur everywhere. About one third of the fatalities occur in traffic; another third happens in the home; and the remaining third is nearly equally divided between those in industry and those in public places other

than in traffic.

A Personal Problem. All through the ages, man has struggled for safety. Primitive man dwelt in caves or in treetops for protection from wild beasts and savage primitive tribesmen. He had to be constantly on the alert to protect himself and his family from ever-lurking Those who survived learned to dangers. protect themselves by pulling up the ladder of vines or by rolling a rock before the mouth of the cave. Gradually, various weapons and implements were invented and discoveries were made which brought greater comfort and safety. As civilization developed, more and more hazards were overcome. Better homes were constructed, bridges and roads were built which could be traversed with less fear of accident, larger and safer ships sailed the seas, and the number of dangerous animals diminished. And yet, as many of the hazards which beset men of earlier ages gradually disappeared, they were replaced by others which often proved to be even more dangerous. Machines created to serve man all too frequently became his destroyer. Man's ability to invent and construct machines has developed faster than his ability to use them safely.

Other factors that have increased the hazards of modern living are men's dependence upon each other, and congested living conditions. When the country was less densely settled and each person was more dependent upon his own activities for satisfying most of his wants, what one individual did had little effect upon others. Today, the careless act of a bus driver, a railroad worker, or a mechanic may jeopardize the

lives of many people.

It is a fact that most accidents are caused by carelessness and could be prevented. Many industrial plants have greatly reduced the

number of accidents by placing the proper safety devices and guards on machines and by insisting upon good housekeeping and caution on the part of workers. Many cities have reduced the number of traffic accidents by proper law enforcement and by the education of motorists and pedestrians. If all persons used good judgment and exercised proper care, a great majority of accidents would be eliminated.

Practicing safety does not compel a person to live a drab, uninteresting life. Such courageous adventurers as Colonel Charles A. Lindbergh and Admiral Richard E. Byrd are great believers in safety. They make careful preparation and take every precaution to make their undertakings a success. They are living examples of how carefulness makes great adventure possible. Everyone who wishes to live a successful and colorful life must take adequate precautions so that his adventures will not be cut short by unnecessary accidents.

Safety at Home

"Safe at home" is an expression one often hears. From earliest times down to the present, home has been regarded as a refuge for young and old alike. Yet about half of all the injuries and one third of all the fatalities caused by accidents occur in homes, according to statistics published by the National Safety Council. Certainly with such an accident record as this there are many homes that do not deserve to be considered refuges. Parents and children alike need to make a careful study of their homes to see how they can be made safer places in which to live.

Prevention of Falls. Of the 33,000 deaths which resulted from home accidents in 1940, 25,600, or about three fourths, were caused by falls. This is a serious cause of injury to persons of all ages, but particularly to elderly persons.

Many falls are caused by poor housekeeping, such as not mending ripped seams and worn places in rugs, or permitting oil, grease, or water spilled on the floor to remain there instead of immediately wiping it up. Even good housekeepers sometimes do not have the imagination to recognize a hazardous condition before it causes an accident. Thus they are proud of their highly polished, slippery floors, and they make dangerous such places as the top and bottom of a flight of stairs by placing there unanchored small rugs. The good housekeeper who wishes her family to be really safe at home will be on the alert to eliminate these hazards. She will see that small rugs are kept in place with rug anchors; that rubber mats are used in slippery showers and bathtubs; that objects are kept in their proper places when not in use; that toys, clothing, and household utensils are not left lying on the floor or steps for persons to stumble over; that sidewalks and steps are kept free of ice, using sand, salt, or ashes when

Allowing houses to get in bad repair frequently causes falls. Stair treads must be firm and stair and porch railings in good condition. Lights should be placed at the head and foot of stairways and in hallways which would otherwise be dark.

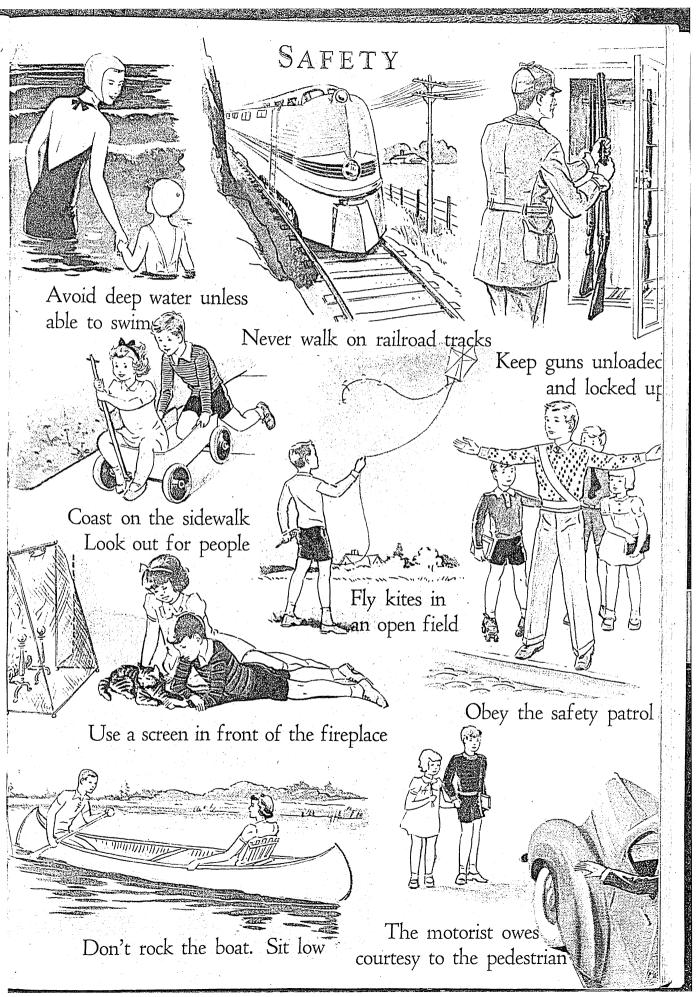
Special precautions should be taken when there are very young children in the home. Safety gates at the head and foot of stairs and firm hooks on window screens save them from dangerous falls. They should be placed in suitable play pens when they are not being watched, and when they are put in carriage or high chair they should be securely fastened in.

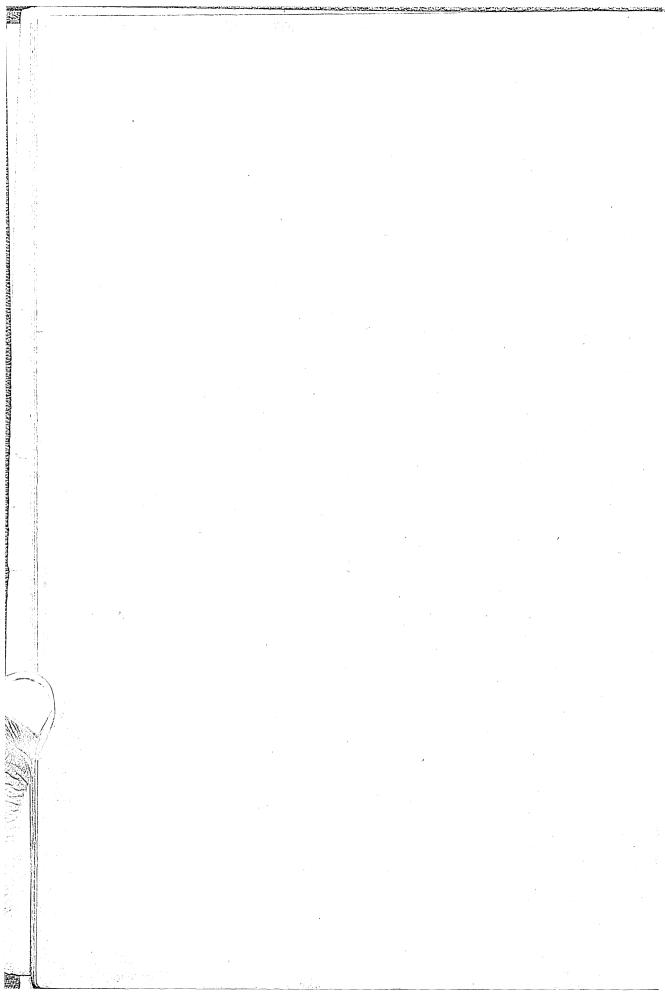
Many falls are caused by thoughtless acts, such as attempting to reach a high place by using a rocking chair or box instead of a firm stepladder. Striving to make thoughtfulness habitual, one should walk up and down stairs carefully; use special care when carrying large bundles or objects; turn on the light whenever possible before entering a dark room; avoid sitting on window sills or leaning out of windows; and not tilt back in a chair but keep the chair legs firmly on the floor.

Prevention of Burns and Scalds. Burns and scalds are second only to falls as a cause of accidental fatalities in the home. Like falls, many burns and scalds are caused by poor housekeeping and careless acts. Some necessary precautions are: keep matches in a safe, non-inflammable container well out of the reach of young children and away from the heat of stoves or pipes; strike them away from the person so that if the head flies off it will not set fire to the clothing; do not take lighted matches or candles into clothes closets or other places where inflammable material is stored; if candles or lamps are used, place them on a firm base and extinguish them before the last person leaves the house or goes to bed.

Many serious burns or scalds are caused by the use of inflammable cleaning fluids which are highly explosive. It is far better to hire dry cleaning done than to take foolish chances with fluids containing gasoline or benzine. Kerosene is another fluid which frequently causes burns and fires. It should never be used to aid in starting a wood or coal fire.

Most frequently burns or scalds occur near stoves or fireplaces. These places are safe if common sense and careful action are practiced. Fireplaces should be screened. Handles of pots and pans containing hot liquids or foods should be turned in so that they are not likely to be reached by young children or accidentally upset by older persons. When lighting gas ovens, the doors of both broiler and baking ovens should be open before the match is lighted. The flames from burning fat should be extinguished by smothering with sand or a metal





cover. See Burns and Scalds; Fire.

Prevention of Poisoning. Accidental poisoning causes many deaths in homes each year. The contents of medicine cabinets should not be accessible to young children. Many of the medicines to be found there are harmful if not taken in the proper doses and for the proper purposes. It is wise to mark distinctly all bottles containing poisonous substances so that they will be readily recognized. One should always look at the label on the bottle before taking medicine and should never take medicine in the dark. A careful householder inspects the medicine chest frequently and disposes of the bottles of old medicine for which there is no longer any use.

Many common household supplies such as ammonia, lye, lysol, and cleaning powders are poisonous and should be kept under lock and key. Foods that are not fresh or properly cared for sometimes become poisonous. A list of antidotes for common poisons should be readily available in every home, and the simple first aid for accidental poisoning—washing out the stomach again and again—should be known by everyone. See Antidote.

Prevention of Asphyxiation. Many lives are lost because of escaping gas. A careful householder makes certain that there is good ventilation when gas appliances are used and provides vents for disposal of fumes. He also uses metal piping instead of rubber for gas connections. He sees that the gas cocks fit tightly enough to prevent the key from being turned too easily. He knows that pots which may boil over and extinguish a gas flame should not be left unattended. He is careful to report all gas leaks to the gas company immediately and keeps his furnace in good repair to prevent coal gas from escaping.

Carbon monoxide poisoning, resulting from inhaling fumes from the exhaust of an automobile engine, can be avoided by running the engine in the open or in a garage with an open door or window.

Asphyxiation is also caused by stoppage of breathing due to mechanical reasons. Small hard substances such as coins or marbles which may become lodged in the windpipe should be kept out of the mouth. Very young children sometimes suffocate while they are in bed. A young child's covers should be fastened so that they cannot be pulled over his head, and only a small pillow, if any, should be used. See ASPHYXIATION.

Prevention of Cuts and Scratches. Cuts and scratches, like other accidental injuries, are usually the result of someone's carelessness. Young children can not safely handle glassware and sharp and pointed objects, and these should be kept out of their reach. Tacks, pins, and needles should be picked up as soon as dropped. Boards with protruding nails or materials with

sharp edges should be stored in a safe place. When using a knife, one should cut away from himself. When carrying sharp or pointed objects, one should walk carefully.

Safe Use of Electricity. Defective electric wiring or appliances occasionally are the cause of destructive fires and fatal electric shock in the home. It is a good rule to have all electric wiring done by a competent electrician and to use only high grade electrical appliances. Cords should be inspected regularly and those that are worn replaced without delay. Cords should not be run over radiators or steam pipes, nor should they be run under a rug or through a doorway, as the constant walking on the rug and closing of the door may wear off the insulation.

A person should avoid touching an electric cord or fixture while his hands are damp or while he is in the bathtub. Electrical appliances should be disconnected when they are not in use. They should be disconnected carefully, and not by pulling the cord for this tends to loosen the connection and is a frequent cause of trouble. See Electric Light; Electrocution.

Other Home Hazards. It is impossible to describe all of the hazards of the modern home. Each year new appliances are invented for use in the home and many of these require special precautions if they are to be used safely. Some good rules to follow are: never use any equipment carelessly; always keep the safeguards in place on dangerous parts; never oil while the motor is running; and carefully follow the directions for use and upkeep. Thoughtlessly getting too close to exposed moving parts such as the wringer of the washing machine and the blades of the electric beater is the cause of many serious accidents.

Safety at School

Wherever large numbers of persons congregate, special safety precautions need to be taken. That is why there are laws requiring safe construction, inspection, and use of such buildings as theaters and schools. New buildings must be of fireproof construction; old buildings not constructed according to the provisions of the new codes must be provided with adequate outside fire escapes, exits must be clearly marked, and doors must swing outward and open easily.

Not only is it necessary to provide safe buildings, but people must be willing to obey certain rules if they are to escape injury when they are gathered in large groups. It is necessary, for example, for children attending school to follow many such regulations so that the safety of the entire student body will be assured.

Gymnasiums and Athletic Fields. Fully one third of all the accidents occurring in school buildings happen in gymnasiums. A large

number also occur on athletic fields. This does not mean that physical education or sports should be curtailed or abolished. The benefits derived from many such activities doubtless offset the hazards that are bound to accompany almost any form of vigorous physical exercise. However, there are many more accidents in such activities than one would necessarily expect. Much can be done to reduce this number.

There would be a marked reduction in the number of accidents if gymnasiums and playing fields were properly constructed and equipped and kept in good condition. Gymnasium floors should not be slippery. Sharp pillars and posts should be well padded. Mats should be provided for many activities and apparatus should be inspected each day and kept in good repair. The surface of athletic fields should be smooth and free from ruts, broken glass, and the like.

Persons engaging in strenuous physical activity should be in good physical condition. It is important to play games according to the rules, since most rules are made not only to insure good sportsmanship but for the protection of players as well. Proper clothing should be worn. In locker and shower rooms, running and rough play should be prohibited.

Corridors and Stairs. In crowded schools attended by many pupils, traffic conditions in the corridors and on the stairs present an important problem. Here it is necessary to have common-sense rules such as: keep to the right; avoid crowding and shoving; look ahead; walk, do not run; keep corridors and stairs free from obstructions; go up and down stairs one step at a time; obey hall guards.

a time; obey hall guards.

Classrooms. Even in classrooms injuries sometimes occur. Here as elsewhere good housekeeping is necessary. Doors and fire escapes should be free from obstructions, and aisles and cloakrooms should be cleared of objects which might cause a person to stumble. Defective seats and desks should be reported at once, and all materials stored neatly in safe places.

Pupils should sit properly, keeping the feet out of the aisles and avoiding tipping back their chairs. Scissors, pencils, pens, and other sharp objects should be carried with points protected. In classrooms as in halls there is little likelihood of accidental injuries if pupils conduct themselves in a mannerly way.

Shops and Laboratories. Because of the nature of activities carried on in them, shops and laboratories present special hazards. For many years, teachers of industrial arts have been laying great stress upon safety. They know that frequently one of the first questions asked about an applicant by an employer is "Would he make a safe workman?" The thoughtless, "accident-prone" workman is not wanted, as he is only an expense.

The safety activities in many school shops are organized along the same lines as in industry. A pupil in each class is appointed to the position of safety inspector. He sees that his fellow students wear aprons when necessary and keep their sleeves rolled up and their neckties tucked in. He sees that goggles are worn at the grinder or at other places where there is danger of flying splinters and that objects on the floor are picked up. Spilled oil is immediately wiped up and oily rags placed in metal containers. Tools are kept in the storeroom when not in use and those that are defective are reported to the instructor without delay. Machines are used only with permission of the instructor, and the inspector insists that safety guards be in place while machines are running. Provision is made for the correct first aid treatment when accidents do occur.

In home economics rooms, much of the material in this article given under "Safety at Home" is applicable. In chemical laboratories, students handle glassware, burners, and chemicals. Beginners need special instruction about how to handle these if they are to avoid accident. Students should always read the directions and learn the precautions to be taken before beginning the experiment.

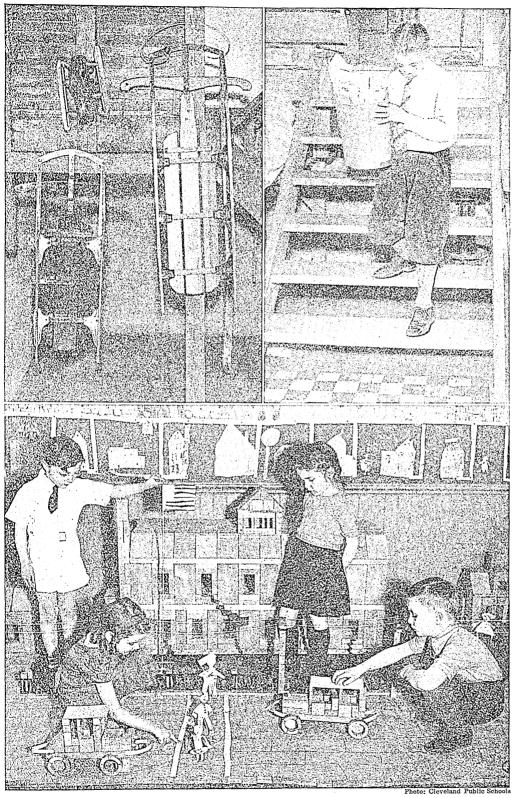
School Grounds. About as many accidents occur on school grounds as in school buildings. Before and after school and during the recess period, when the playground is crowded, children should refrain from throwing missiles and from unduly rough play. Groups should play games a safe distance from other groups. The play space should be kept free from sticks, nails, glass, and other rubbish. All accidents should be reported promptly.

Safety Instruction in the Classroom. Safety education has assumed an important place in the modern school curriculum. Instruction in this subject extends from the earliest elementary grades through the high school. In many states, such instruction is required by law.

One of the most recent subjects to be included in the high school curriculum is safe automobile driving. In thousands of high schools, classroom instruction in this subject is provided, and in many schools this is followed by actual road instruction. Usually this latter type of training is carried on in dual control cars so that the instructor can take control of the car without a moment's delay.

School Safety Councils. In many schools, safety councils composed of pupils elected to represent the various homerooms have been organized. These councils have much to do with the safety conditions in and about the school building. They hold regular meetings and the members report back to the groups they represent.

Much of the work of the safety council is done through committees. Perhaps the most impor-



Practicing Safety. Upper left, safe storage of skates and sleds. Upper right, safe way to carry a waste basket. Below, young children with a safety project in school. Early training produces results. 6294e



SAFETY AT THE SKATING POND Choose safe places to skate. Obey the warning signs.

tant committee is the safety patrol (see below). The inspection committee inspects the building and grounds for conditions that should be corrected. When it finds hazards, they are reported to the proper person for remedy. The publicity committee has charge of safety bulletin boards, the safety columns in the school newspaper, and in general publicizes the activities of the council. The hall committee has the responsibility of looking out for traffic conditions in the corridors and on the stairs. accident-reporting committee collects the reports of injuries from each room each week and makes the building summary. Many schools co-operate with the National Safety Council by sending monthly summaries of accidental injuries to that organization. The program committee has the responsibility of preparing a program for each meeting of the safety council, which follows the business meet-This committee also prepares safety programs for assemblies, Parent-Teacher meetings, and the like.

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Safety Patrols. Members of the safety patrol are assigned the important duty of helping children cross dangerous streets near the school. They are not regular traffic officers because they do not have authority to stop vehicular traffic. They take their post at the curb and keep children back from the street until it is safe to cross. If there is a traffic light they follow its directions. If there is a traffic officer they work under his guidance. If neither of these are present, the pupil safety patrols wait for a lull in traffic and when this occurs they permit the children to cross. The white Sam Browne belt is the standard insignia of safety patrols. Standard rules may be secured from the National Safety Council, Chicago, or from the American Automobile Association, which is located at Washington, D. C.

School Bus Patrols. In rural sections, where school buses are used to transport children to and from school, much attention is paid to safety. State officials inspect the buses, which must be kept in a safe condition. In many states, drivers have to pass examinations to prove that they are safe. Drivers and passengers have definite rules which they must follow. Pupil bus patrols, selected from among the older pupils who ride on the bus, assist the bus driver in caring for the safety of the children. It is their duty, under the guidance of the driver, to help children get on and off the bus safely and to see that children behave properly while riding on the bus.

Other Safety Organizations. In some schools are found other types of pupil safety organizations. Among these are the Junior Motor Club, Bicycle Club, and Student Traffic Court. Safety and first aid are among the topics in which the American Junior Red Cross is interested. See RED CROSS SOCIETIES (Junior Red Cross).

Safety in Outdoor Recreation

Outdoor recreation is both pleasant and healthful. Some authorities believe that children should engage in four or five hours of such activities daily. If outdoor fun is not to be marred by accident, certain common sense precautions must be taken.

Safety on the Playground. City authorities are coming to realize that safe places to play must be provided for young people; consequently many boys and girls have access to well-equipped and well-organized playgrounds. If playgrounds are to be the safe places they should be, those who use them must be thoughtful of others. It is necessary to keep the grounds in orderly condition, free from rubbish. Play apparatus should be kept in good repair,

and should not be used when it is wet. It should be used in the way in which it was intended to be used and not for stunts.

Swings cause many accidents, especially to children who stand or play too near them while others are swinging. Wise playground attend-ants put white marks around the swings to show the danger line and insist that only one person at a time use a swing, that the person be seated while swinging, that he does not swing too high, and that he does not try to dismount until the swing has stopped. Accidents are also caused by careless use of other apparatus such as teeterboards, slides, and giant strides. Those who use teeterboards should remain seated and face each other. They should never dismount from the board without warning the person at the other end, and, when dismounting, each person should be careful so as not to injure the other. On slides, children should slide down feet first in a sitting position, being careful to keep their hands away from the sides. Before starting to slide it is wise to wait until the preceding child has stepped away from the bottom of the slide. Those using giant strides should not put their feet through the rungs of the ladder but should hang on with their hands. When wishing to stop, they should run inward and stop at the pole until all have stopped swinging. It is dangerous to drop the chains and run outward.

When playing baseball, it is safer to use a soft ball unless the field is very large and no other groups are playing near by. Batters should always drop the bat, never throw it, and onlookers should stay a safe distance away. Players should stop at the curb and look both ways before attempting to retrieve a ball from the street.

In the spring, kite flying is a popular sport on many playgrounds. Kites should be flown where there is no danger of their being caught on electric wires. Because of the great danger of electric shock, children should never attempt to retrieve a kite that has been caught in the wires. It is dangerous to use a wet string, or to use a wire or string with wire in it for a kite string, because these conduct electricity.

Safety While Hiking. Among the most pleasant of outdoor sports is hiking. To enjoy this activity it is necessary to make adequate preparation. One should dress properly, according to the season of the year. Heavy shoes and stockings help to prevent blistering of the feet. In every hiking party there should be a first aid kit and instruction book, and if the group is going into wild country it is wise to carry a compass. If knives and hatchets are carried, the blades should be covered.

When walking on the open highway it is best to walk single file and to stay on the left side of the road facing oncoming traffic. It is a dangerous practice to hike on railroad tracks. Hikers should plan their trip so as to avoid walking on the highway after dark. If, however, it is necessary to walk on the highway after dark, white clothing or a light will aid in giving passing motorists warning. If there is any doubt about getting safe water on the way, it is best to carry a supply of drinking water. See Snake; Poisonous Plants; Poison Ivy; Insects; First Aid to the Injured.

Water Safety. Approximately 6,300 persons in the United States are drowned annually. Fatalities of this type reach their largest number among those of high school age. In recent years there has been an increase in the number of persons participating in water sports. That the number of drownings has not kept pace with this increase is partly due to the water safety programs sponsored by the American Red Cross, the Boy Scouts, the Girl Scouts, the Y.M.C.A., schools, and other agencies.

The number of drownings will be greatly reduced if a few common sense rules are obeyed. Perhaps the most important of all water safety rules is to swim only at a protected beach or pool where there is a lifeguard on duty. Other important rules to follow are: wait at least two hours after eating before swimming, to avoid stomach cramps; never go swimming alone; always be accompanied by a person in a boat when swimming long distances; be sure the water is deep enough before diving; become an expert swimmer before venturing into deep water.

Only those who are good swimmers should go out in canoes or small boats. Before a boat is used, it should be checked carefully to make sure that it is seaworthy. Good boatmen pay close attention to the weather and refuse to go out when a storm is brewing, or when there is a fog. They are careful not to overload the boat, not to change seats when in deep water, and not to engage in rough play or scuffling. They know that if their boat should capsize they should cling to it, since it is a good life preserver.

One of the greatest annoyances to those who engage in water sports is sunburn. Water reflects the heat from the sun and intensifies the effect of its rays. Sunburn can be avoided by accustoming the skin to the sun's rays gradually. The first exposure should not be over ten or fifteen minutes. As a coat of tan is acquired the duration of exposures may be increased. For treatment of sunburn see First Aid. Also see Swimming; Drowning.

Safety in Winter Sports. One of the most exhilarating of winter sports is coasting. In many places safe coasting has become difficult because of heavy automobile traffic. Only hills free from traffic or streets that have been roped off by the police for this purpose should be used. Coasters should follow traffic rules,

SAFETY

IN THE HOME

Tricycles, roller skates, and other toys left on steps and stairways, right, often lead to serious falls. Even the very young child may help by learning to put away his playthings carefully.



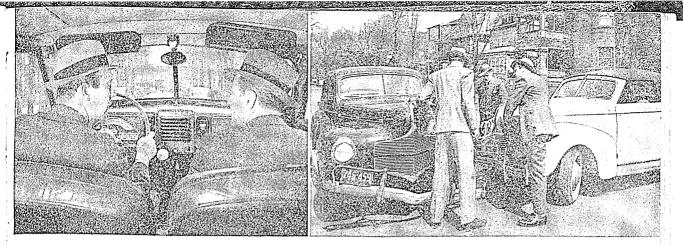


The small child taken to the kitchen but not placed in a play pen or elsewhere out of danger is often fatally scalded or badly scarred when she reaches for pans on the stove, upper left. To avoid such an accident, the safety-conscious mother keeps a watchful eye on her child and puts all hot pots and pans out of reach. A firm stepladder is safer for use in climbing than a chair, upper right, which tips and

often causes serious falls. Rubbish in attic and basement is a constant fire hazard. This boy, lower left, having learned such facts in a school safety class, is removing boxes, rags, and old papers. Because rickety steps and porch railings are the cause of many falls, this man, lower right, makes all needed repairs without delay to prevent possible accidents, often costly in pain, time, and money.







IN STREET, OFFICE, AND FACTORY



Many accidents occur, top right, when motorists take their eyes off the road, top left. Careful pedestrians cross the street at the proper places, obey traffic lights, and watch for approaching automobiles. They know that "jaywalking," upper left, may cost time and money and even result in injury or death. The innocent-looking paper clip and These photographs were selected from a film used in the Safety Zone

rubber band in the hand of a prankster, upper right, may doom another to a lifetime of blindness. Spilled grease, lower left, is a hazard everywhere and should be removed at once. Safety in the shipping room requires that workers keep all passageways clear of obstructions and watch where they are walking, lower right; otherwise, accidents may result. Program sponsored by the Zurich Group of Insurance Companies.



keeping to the right while going up or down the hill, and they should be careful of the safety of others at all times.

Ice skating is another healthful winter sport. It is wise to skate only on supervised rinks where it is known that the ice is safe. A good rule to follow is:

> One inch, keep off; Two inches, one may; Three inches, small groups; Four inches, O. K.

Those who skate on ponds, lakes, or rivers should have readily available ropes or planks to assist a person who may fall through the ice.

There has been a revival of interest in skiing in the United States. Each weekend during the snow season, "Ski Trains" take great crowds from nearby cities to hills and mountains for this sport. Skiers should always look over unknown slopes before trying them. They should ski cautiously when there is a light snow fall or a crust. Ski poles should not be carried across the front of the body, and beginners should have the heel straps open so that in case of a fall the shoes will slip easily out of the skis.

Snowballing is great sport but hard snowballs are dangerous missiles. They should be used only for distance or target-throwing contests.

Safe Use of Firearms. A surprisingly large number of persons (approximately 2,400) are killed each year as the result of firearms accidents. Like drownings, accidents from this cause are most numerous among young persons of high school age. How often do we read, "I didn't know it was loaded," as an excuse for an accidental shooting! A safe rule to follow is never to point a gun at anyone, even if it is believed to be unloaded. Firearms should always be unloaded before they are put away and should be kept out of the reach of little children. When carrying a gun, its muzzle should be pointed upward or downward, never toward people. When climbing through a fence with a gun, it should be put through first, muzzle forward. Before one shoots in the open, every precaution for the safety of others should be taken. A person should wear a red cap or red handkerchief on his head when he is walking through the woods during hunting season.

Safety on the Street and Highway

The greatest single cause of accidental injury is the automobile. In 1940, motor vehicle fatalities in the United States numbered 34,500. This was a 7 per cent increase over 1939.

Precautions for Pedestrians. Many persons killed or injured in traffic accidents are pedestrians, and frequently the pedestrian is to blame. Many such accidents could be avoided if pedestrians followed certain common sense precautions. Wherever possible, streets should

be crossed at designated crosswalks. One should look left and then right before starting to cross the street. At intersections where there are traffic officers or lights these should be obeyed. Streets should be crossed at right angles and pedestrians should be on the alert for cars about to make turns at intersections. If a person becomes confused when crossing the street, he should avoid sudden moves. He should exercise great care when stepping out from between parked cars and should never stand or play in the street.

Precautions for Street Car, Bus, and Automobile Riders. When waiting to board a street car or bus, wait in the safety zone or on the curb. In a safety zone, face oncoming traffic. After alighting from a street car, remain in the safety zone until it is safe to cross to the curb. One should be expecially careful about crossing in front of or behind the vehicle from which he has alighted. Entering or alighting from an automobile should be done from the curb side. When riding in a street car or motor vehicle, keep the arms inside, and refrain from talking to the motorman or bus driver, as this may distract his attention and cause an accident.

Precautions for Children Using Roller Skates and Wheel Toys. Children should use roller skates, wagons, tricycles, pushmobiles, and the like only on sidewalks, or on streets officially closed to traffic. They should watch out for cars backing out of driveways and should be courteous to other users of the sidewalk. Roller skates should be removed before crossing a busy street or before going up or down stairs. One should never carry sharp objects or glass

bottles when skating.

Precautions for Bicycle Riders. Where cycle paths are not provided, it is necessary for cyclists to share the streets and highways with automobiles or to remain on the sidewalk. This means that cyclists must know and scrupulously follow the traffic rules if they are to avoid accidents. They should keep to the right near the curb; use hand signals; carry head and tail lights when riding at night; obey traffic lights, signs, and officers; and keep their bicycles in good repair. They should not ride in congested places; "hitch" on a street car or automobile; carry another person on the frame; or perform stunts in traffic.

Precautions for Drivers of Automobiles. There are so many things that drivers of today need to know if they are to operate their automobiles safely that many schools have introduced full semester courses in this subject. Among the topics with which all drivers should be familiar are: the traffic laws; proper attitudes; their own physical and mental makeup; how to drive under all types of conditions; and a knowledge of what pedestrians and other drivers are likely to do. To acquire all these skills and this information requires long and concentrated study and practice. • Yet so great are the hazards on streets and highways that society has the right to expect all drivers to undergo this training. See ROADS AND STREETS.

Safety in Other Means of Transportation

Greater strides in safety have been made in other forms of transportation than in motor vehicle travel. For many years, railroads have been stressing safety and improving equipment and service until now riding on a train is probably the safest form of travel. Very few passengers or employees are killed. Most railroad fatalities occur to motorists at grade crossings and to those trespassing upon railroad property.

Likewise ships are now a relatively safe means of transportation. They are equipped with a great variety of safety devices, and crews are well-trained for all emergencies. The United States Government inspects ships regularly and through the Lighthouse Service and the Coast Guard does much to insure safety.

Even aviation is not as dangerous as many persons consider it. Here too, passengers are relatively safe, thanks to the great strides made in the industry and to the regulations imposed and assistance given by the United States Government.

Safety in Industry

One of the most inspiring facts in the whole safety movement has been the remarkable reduction in occupational accidents. In 1913, 35,000 workers in the United States lost their lives in industry. By 1940 the number was reduced to 17,000. There are many causes cited for this improvement. Primary among them has been the installation of guards on machines. Thus saws, gears, belts, and emery stones all are equipped with safety devices.

Another factor has been the development of safety clothing. In a modern factory one is likely to see men wearing helmets, gas masks, goggles, heat-resisting gloves, leggings, and safety shoes.

Lighting has been greatly improved and exhaust systems draw off dust and poisonous fumes. Good housekeeping is everywhere in evidence. "A place for everything and everything in its place" is the motto.

Finally, safety instruction has become a regular part of the working day. It is not unusual to shut down the machinery of a great plant to hold a safety meeting. Workers are taught safe methods by means of posters, moving pictures, and lectures. To make certain that lessons have been well learned, safety inspectors are constantly on the job. This industry has done for humanitarian reasons and because it has learned that "safety pays." L.R.S.

SAFETY CLUB. See ACCIDENT PREVEN-TION. SAFETY COUNCIL, NATIONAL. See NATIONAL SAFETY COUNCIL.

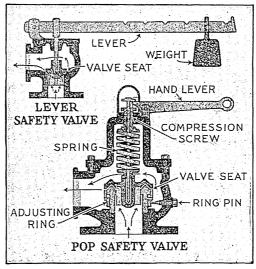
SAFETY DEVICES. See SAFETY.

SAFETY LAMP, a lamp designed to protect miners from explosions of fire damp. All varieties of safety lamps are based on the principle used by the English chemist, Sir Humphry Davy. Although an attempt to devise such a lamp was made in 1813, Davy invented the first successful lamp in 1816. It consists of an oil lamp surrounded by a cylinder of wire gauze of fine mesh, which forms a sort of cage. The heat of the flame will not pass beyond this gauze covering and ignite the gas on the outside until the wire becomes as hot as the flame, and, owing to its good conducting power, it will not become so heated before the miner has time to withdraw from the locality of danger.

One of the chief uses of the lamp is to warn the miner of the presence of the deadly fire damp; the other is to protect him from the danger arising from the presence of this gas. If fire damp invades the workings, it can be detected by lowering the wick, when a pale-blue flame will be noticed about the central flame of the lamp. A reasonably prudent miner, observing this peculiarity, will at once leave the menaced workings, for explosions of fire damp are exceedingly destructive. Lamps are usually locked, so they cannot be opened by miners. Some are made to go out when opened. See Fire Damp; Davy, Sir Humphry.

SAFETY VALVE, an appliance attached to

SAFETY VALVE, an appliance attached to steam boilers to allow steam to escape when the pressure becomes too great for safety. The



TWO SAFETY VALVES

"lever safety valve" is a kind of stopper closing a circular orifice. The stopper is connected to a lever which is loaded with a weight.

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The pressure on the stopper is regulated by moving the weight along the lever. The weight holds the valve in place with a pressure gauged to be several pounds below the pressure which the boiler may safely sustain. When the limit of safety is approached, the pressure of the steam raises the stopper and some of the steam escapes. This lever type of safety valve is now prohibited by law in most states.

The pop safety valve is the modern type now in general use. In this design a spring takes the place of the lever and weight. The pressure exerted by the valve is regulated by varying the tension in the spring. See BOILER.

SAFFLOWER, saf' lou ur, a thistlelike plant belonging to the composite family. It is cultivated in India, China, Egypt, and Southern Europe for its orange-colored flowers. From these flowers, after they have been dried, yellow and red dyes are made. The red dye, which is the more valuable, is used to a limited extent in coloring silks in various shades of pink, rose, scarlet, and crimson, but better substitutes have largely taken its place. It is also employed in the manufacture of rouge. The yellow dye is sometimes used to adulterate saffron, but has little value as a coloring matter. Oil yielded by the seeds is used as fuel in lamps and for cooking purposes in the East.

Scientific Name. The botanical name of the safflower is *Carthanus tinctorius*. It belongs to the family *Compositae*.

Related Subjects. The reader is referred in these volumes to the following articles:

Composite Family Dyeing and Dyestuffs Saffron

SAFFRON, saf' run, a yellow coloring matter and flavoring material obtained by drying the stigmas of the yellow autumn crocus (see Crocus). Four thousand flowers yield one ounce of commercial saffron. The product has a sweetish, aromatic odor and a bitter taste. It is employed in cookery and to flavor and color candy, and, in Europe and India, as a condiment. Its use in painting and dyeing has declined with the discovery of more enduring coloring matters. Though once widely employed as a stimulant and preventive of spasms, saffron now has little value as a medicine. T.B.J.

SAFID RUD RIVER. See Persia. SAGAMORE. See TAMMANY SOCIETY. SAGAMORE HILL. See ROOSEVELT, THEO-DORE, panel heading.

SAGAS, sah' gahs, or sa' gahs, the name given in Iceland to a form of literature which may best be described as the prose epic. The sagas are narratives, either historical, mythical, or romantic, of the great heroes and rulers of Iceland, and they are composed according to rules as strict as those which govern verse. A typical saga traces the life of its hero from his birth to his death, including often, if his death

was by violence, an account of the vengeance which his family took. Alliteration is common, and verse is often introduced as an ornament, though forming no part of the stories.

These sagas were originally preserved orally, and were composed to be recited at banquets or other festive gatherings, or in the long nights

SPECIMEN OF SAGA MANUSCRIPT

of that northern country, where other diversions were few. By the twelfth century, literary men had recognized the value of these tales and began to write them down, but by far the greater number were written in the thirteenth century. Naturally, the aristocratic families were much interested in having the lives of their ancestors recorded in this form.

Greatest of these compositions is the Njalssaga, the saga of law, but the Eyrbyggiasaga, with its store of history and traditions, is also a most valuable work. The romantic Laxdaelasaga, the Gislasaga, and the Volsungasaga, which contains the Nibelungen story in prose form, are also notable. The authors of some of these works are known, but there is no clue to the identity of many of them. See Norway (Language and Literature); German Literature; Iceland.

SAGE, a shrubby plant belonging to the mint family, which is cultivated widely as a garden herb. The aromatic stems and leaves, whose flavor is due to an essential oil, constitute a much-valued seasoning for sausages, meat dressings, sauces, and cheese. Sage tea, too, has long been regarded as a standard household tonic, astringent, and aid to digestion. The plant has rough, gray-green leaves and square stems; the flowers, which are blue with white and purple variations, grow in clusters.

Sage is native to Southern Europe, and when grown elsewhere, it needs a sunny location and rich, well-drained soil. It can be propagated by seed, slips, or cuttings. Sage from the home garden can be kept for winter use if bunches of shoots are dried in a light, airy place

Scientific Name. Sage belongs to the family Menthaceae (or Labiatae). The botanical name of garden sage is Salvia officinalis. There are several other species, both cultivated and wild.

SAGE, the family name of an American financier who left an immense fortune to his wife, who used it for philanthropy.

Russell Sage (1816-1906) acquired a fortune of over \$50,000,000 in railroad operations and stock speculation. He was born in Oneida County, N. Y. He worked as a farm boy, but at fifteen became an errand boy in a grocery. Later, he entered the grocery business, but his first notable success was in company with Jay Gould, the greatest railroad manipulator of his time. Sage served his community in minor political offices, and in 1853 was elected as a Whig to Congress, where he remained two terms. The rest of his long life was spent as a financier. A self-centered, austere man, he made few friends and cared nothing for the criticism of his enemies. His entire fortune was left to his wife, to dispose of as she pleased.

Margaret Olivia Slocum Sage (1828-1918) was born at Syracuse, N. Y., and educated at the Troy Female Seminary. After her husband's death, she became known as one of America's greatest philanthropists. The Russell Sage Foundation, established by her in 1907, "for the improvement of social and living conditions in the United States," has an en-

dowment of \$15,000,000. Out of this fund, model apartments have been built in New York City and its suburbs, and similar work has been done along social and charitable lines. Forest Hill Gardens, on Long Island, was established as a model suburban community, and Marsh Island, in the Gulf of Mexico, was purchased as a home for birds through Mrs. Sage's bounty. She also established in Troy, N. Y., the Emma Willard College for women. See Russell Sage Foundation.

SAGEBRUSH, the name of various species of shrubby plants belonging to the composite family, found on the alkaline plains of Western United States. The profuse growth of sagebrush in Nevada has given rise to the popular name Sagebrush State for that commonwealth, and Nevada's flower emblem is the sagebrush. The typical species grows from six to twelve feet in height and has a straight, stiff stem, on which grow, in close profusion, small, wedge-shaped leaves with from three to seven notches. The flowers, which consist of many tiny florets, grow at the top of the branches. Some of the true sages, which are known as Salvia and belong to the mint family, are found in much the same situation as the sagebrush. The purple sage, the white, and the black sage all come in this class.

Some varieties of sagebrush form the winter forage of sheep on the Western ranges, and in some sections, the settlers use the plants for fuel

In the arid summer season, on the plains, the sagebrush dries until it shows no sign of green; when the high winds blow, it frequently pulls loose and drifts over the plains in masses not unlike tumbleweed. Over thousands and thousands of square miles it is the characteristic, almost the only, form of vegetation. G.M.S.

Scientific Names. These plants belong to the genus Artemisia in the family Compositae. Silvery sage is A. cana; white sage is A. mexicana. So-called prairie sagebrush is A. ludoviciana. The common sagebrush is Artemisia tridentata.

SAGEBRUSH STATE, a popular name applied to Nevada (which see).

SAGE GROUSE, grous. See GROUSE.

SAGE OF MONTICELLO. See JEFFERSON, THOMAS.

SAGHALIN, sah gah lyen', ISLAND. See SAKHALIN.

SAGINAW, MICH., the county seat of Saginaw County, is a manufacturing city, eighty-five miles northwest of Detroit. It extends along both banks of the Saginaw River, which is navigable from this point to its mouth in Saginaw Bay, fifteen miles to the northeast.

In 1822 a settlement called Saginaw City was founded on the west bank of the river, and in 1849 a second settlement, East Saginaw, was made on the opposite bank. The two were consolidated as Saginaw in 1890. In 1936 the commission-manager form of government was adopted. Population, 82,794 (1940).

Transportation. Saginaw is served by the Grand Trunk (Canadian National), Michigan Central, and Pere Marquette railroads, and by several motorbus lines. The Pere Marquette maintains car shops in Saginaw

Industries. The Saginaw area produces large crops of sugar beets which are handled by factories in Bay City and in St. Louis. Another important industry is the mining of bituminous coal. The city once had large sawmills, but these declined with the depletion of the forests of the state. Other important industries include bituminous coal mining, automobile parts, furniture, graphite products, measuring instruments, boilers, Venetian blinds, and machinery. There are more than 142 industries in Saginaw.

Institutions. Prominent structures include a public natatorium, an armory, and two public libraries. There are manual-training and trade schools, a United States Weather Bureau station, Michigan Employment Institution for the Blind, Old Ladies' Home, the Tuberculosis Sanitarium, three hospitals, the Children's and Saint Vincent's Orphans homes. C.W.H.

SAGINAW BAY. See SAGINAW, above. SAGITTARIUS, saj ih ta' rih us, The Archer, the ninth sign of the zodiac, which the sun enters about November 22. It is represented by the sign A, a dart or an arrow. In mythology, the arrow is the one with which Hercules killed the vulture which devoured the liver of Prometheus, when he was chained to a rock as punishment for having stolen sacred fire from heaven. The archer Sagittarius is a centaur, half man and half horse. He is a son of Eupheme, the nurse of the Muses.



SAGEBRUSH STALK

The constellation Sagittarius is south of Aquila (the Eagle) in the southern part of the heavens (see map of the stars under ASTRON-OMY). It contains no bright stars, but has several interesting short-period variables and irregular nebulous masses. The densest part of the Milky Way is in the star clouds of the constellation. See Nebula; Zodiac. F.B.L.

SAGO, a starch contained in the pith of various tropical palms, from which an edible flour, also called sago, is made. The East Indies form the principal source of supply. Sago is similar to arrowroot, cornstarch, and tapioca in composition and uses, and large quantities are exported to Europe and North America for culinary purposes. Sago flour is chiefly valued as a material for puddings and as a thickening for soups. It is very nutritious, and is readily digested. In the East Indies, the natives use it as one of the principal items in the diet.

The trees devoted to the production of sago are not allowed to come to full maturity, for the ripening of the fruit exhausts the starchy center, leaving the trunk a more or less hollow shell and causing the tree to die. These palms are therefore cut down when they are about fifteen years old, being then just ready to flower. The stems are split up, and from them is extracted the starch pith, which is reduced to a powder by grating. The powder is then kneaded in water over a cloth or sieve, through which it passes to a trough, where it settles. After a few washings, the sago flour is ready to be used by the natives in making cakes and soups. Sago prepared for export, however, is given further treatment. The flour is kneaded into a dough by mixing it with water, and the mass is forced through sieves, dropping on hot, greased pans in the form of small grains. The grains vary in size, giving rise to the commercial names of pearl sago, bullet sago, etc. See Starch. E.V.M'C.

[A cycad whose stems yield starch is incorrectly called sago palm. See CYCADS.]

SAGUARO, a national monument in southeastern Arizona. See Monuments, National.

SAGUENAY, sag eh na', RIVER, an important waterway of the Canadian province of Quebec, a tributary of the Saint Lawrence. It is a deep, dark stream, world renowned for the grandeur of its scenery, particularly in its lower course. The Saguenay issues from the eastern end of Lake Saint John, and flows for 405 miles in a general easterly direction into the Saint Lawrence, its mouth being 120 miles northeast of Quebec. For a distance of almost forty miles below the lake, it is a series of rapids and cataracts, navigable only by canoes. At Chicoutimi it becomes navigable for small steamers, and six miles farther down, for larger vessels. From that point to its mouth, a

distance of sixty miles, the Saguenay flows through a rocky, treeless gorge, which gradually rises to a height of 1,800 feet at the Saint Lawrence.

The Lower Saguenay is really a fiord or loch, rather than a river. It is from three-quarters of a mile to two miles wide, and has a depth ranging from 800 to 2,000 feet. At its mouth it is 600 feet deeper than the Saint Lawrence, into which it flows.

Lake Saint John, from which the Saguenay issues, is a shallow body of water covering an area of 350 square miles. It receives numerous important rivers, one of which, the Peribonka, is generally accepted as the upper course of the Saguenay.

SAHAMA, sah hah' mah, or SAMAHA. See ANDES (Divisions); BOLIVIA (The Land and

Its Rivers); Mountain, page 4695.

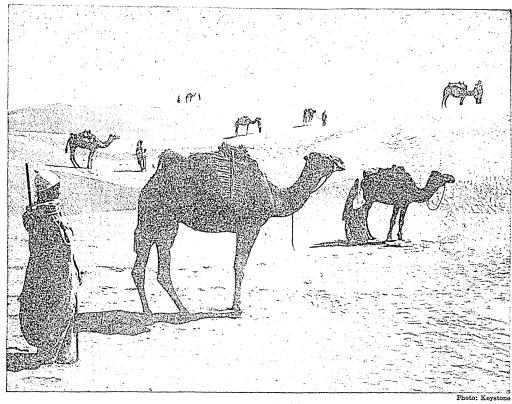
SAHARA, sah hah' rah (in Arabic, sah'h'rah). This greatest desert in the world extends in a wide sweep across the northern part of the continent of Africa, from coast to coast, except where it is intercepted by a narrow ribbon of fertility in the extreme east, where crossed by the River Nile. From the Red Sea, the aridity extends eastward into the Arabian Desert. On the north, the Sahara encroaches on the countries bordering the south shore of the Mediterranean Sea, and southward it extends for distances between 800 and 1,400 miles.

Its physical limits are not everywhere as sharply drawn as they are in those parts of Algeria and Morocco where the traveler looks down, from the ramparts of the Atlas range, upon an undulating and limitless waste. Elsewhere the confines of the desert are often less easy to trace, being merged with the fertile surrounding territory, especially to the south. The greatest length of the desert is 3,200 miles, along the twentieth parallel of north latitude. Its area is estimated at 3,500,000 square miles about that of Canada, or of Europe without the Scandinavian peninsula, or nearly that of the United States, including Alaska.

The Surface of Sahara. The popular im-

pression of the Sahara makes it a solid waste of burning, shifting sand, throughout its area possessing the appearance of an illustration There are, in accompanying this article. truth, veritable oceans of sand, such as are there pictured, but the desert shows other There are stretches in great characteristics. number where the surface is comparatively hard and stony, but as bleak as the sand dunes. Then, too, there is a central plateau extending three-fourths of the distance across it, in a northeasterly-southwesterly direction, with an elevation of from 1,000 to 2,500 feet.

Three mountain ranges, the Ahaggar, the Tibesti, and the Air, rise above this plateau. The highest peaks have altitudes varying from 6,0∞ to over 9,0∞ feet; during the winter,



A CAMEL CARAVAN

Young Numidians are driving a caravan of camels across a sand sea of the Sahara. Not all of the desert is shifting sand, as the small area above shown may lead one to suppose. For other desert pictures, see Arabia; Camel; Desert; Oasis.

their summits are capped with snow. In this mountain region are numerous river valleys. The Western Sahara is a vast sand waste, as is the Libyan Desert, to the north and east of the central plateau. This barren region is without animal or vegetable life, excepting on a few oases. The Libyan Desert extends to the Nile; the region between this river and the Red Sea is mountainous.

Oases. An oasis is a fertile spot in the desert. In the Sahara there are scores of these areas, the appearance of which brings joy to the traveler. The only settled inhabitants of the Sahara proper live on these oases, which may be only a square mile in extent, or so large that, through irrigation, several million date palms may be cultivated. An oasis is watered by springs that are fed by underground sources, which, in turn, receive their supply from water that sinks through the sand to an underlying layer of clay. After thousands of years of acceptance of the conditions imposed by nature, man is beginning to open up new areas for population, by digging wells and thus making new oases, and by extending irrigation works from those where water is plentiful. Owing to the modern scientific methods of the French in reclaiming the desert, in one district alone, Oved Rir, the water supply has been increased 600 per cent. Wherever reclamation has been attempted, it has been found that the soil is fertile, and tropical fruits, millet, and other cereals may be raised.

Excepting on the oases, this vast region has very little life. Few animals have penetrated to the interior, but on the borders where water is obtainable, the lion, the panther, the hyena, the jackal, the fox, and some species of ape are found. The domesticated animals—the camel and the ostrich—for which the desert is a natural environment, find desirable homes in parts of the Sahara. Venomous serpents are numerous, and the huge python makes its home in some regions.

Climate. The dry climate is due to atmospheric conditions. The prevailing winds (trade winds), which blow toward the equator, come mainly from dry Southwest Asia, and so bring no moisture to the country. In summer, the days are exceedingly hot, but the nights are cool. Terrific windstorms blow over the region, carrying such quantities of sand as to imperil travelers.

Photo: Keys
THE EDGE OF THE DESERT IS THEIR HOME

Such groups may be found living close to the arid and inhospitable rocks and sands of Sahara. In the oases that are large enough to sustain a population, people like these also live. It is worthy of note that while much of the world is advancing with almost incredible strides, civilization here has changed little in three hundred years.

The People and Commerce. Until a recent date, most of the commerce of the Sahara was carried by camels in caravans, though Tuareg tribes menaced these wearisome routes throughout the central region. Of course, the camel will continue to be a means of travel for many years, but better transportation is already available for certain sections. The French, who control the greater part of the Sahara, in 1923 sent caterpillar tractors south from the coast to Timbuktu, the journey occupying two weeks, as against three months by caravan. Three motor routes now traverse the region, and motorbusses operate on regular bi-weekly schedules from October to June. Private cars travel most of the roads, but must conform to strict safety regulations. Filling stations, hotels, and rest houses are conveniently located. Another mode of penetrating the vast Sahara fastness is that of airplanes flying

over its wastes, and wireless telegraph is linking the north to the south.

France has officially adopted plans for a Trans-Saharan Railway, but a controversy over routes, such as usually accompanies an improvement of such economic and social importance, has been a cause of delay. This will be the greatest step for France in the conquest of the desert; the Sahara will be transformed into a territory to be explored, developed, and exploited for the extensive natural resources the land is known to possess. Coal, oil, and phosphate beds have already been found, and other minerals will be located.

found, and other minerals will be located.

Arabs, Moors, Berbers, Tuaregs, Bedouins, Tibbus, Negroes, and Jews are found in the Sahara. The first-named are along the northern border; Moors are plentiful in the west; Berbers reach from the Mediterranean coast down into the fringes of the desert, mixing

with the Moors, but not amalgamating with them; the Tuaregs are robber bands; the Bedouins are wandering shepherds and herdsmen, and sometimes plunderers; the Tibbus are of mixed Negro stock; the Negroes proper are very black men who have come up from Africa's interior, on the south. The chief articles of trade are salt, silk, ivory, spices, dates, ostrich feathers, and musk.

The Libyan portion of the Sahara Desert was the scene of attacks and counterattacks by the British and Axis forces during World War II. The British were aided by the "Free French" army led by General de Gaulle. The population of the Sahara is about 2,000,000. R.H.W.

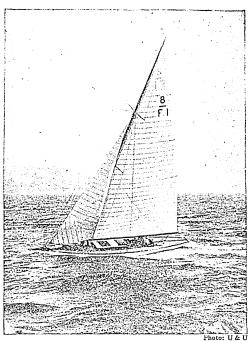
Related Subjects. The following articles in these volumes will be of value in connection with this topic:

Africa Camel Caravan Desert Khamsin Oasis Simoom Sirocco

SAID PASHA. See EGYPT (Under Mohammedan Rule).

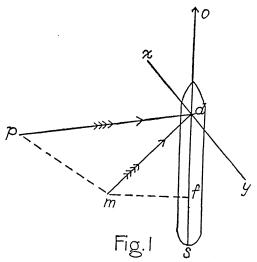
SAIGON, si gohn', capital of Cochin-China. See French Indo-China.

SAILBOAT AND SAILING. It is possible to convert almost any small boat into a sailboat



"SAILING, SAILING, OVER THE BOUNDING MAIN"
The illustration is that of a yacht owned and sailed
by a Frenchwoman. She has taken her vessel first
across the finishing line in races against boats navigated by men.

by raising a mast and attaching a sail to it. But unless a boat has great stability, it is likely to be capsized by a sudden squall, and so the safest sort of sailboat for boys to go cruising in is a flat-bottomed boat, or punt, not less than fourteen feet in length, over all. To turn a punt into a sailboat, it is only necessary to board over the hull and finish the inner edge of the deck with a combing, to prevent any water that may splash over the sides from flow-



[Explanation appears in the text.]

ing into the cockpit, that part of the hull which affords a sheltered place for seats. A hole is then cut in the forward deck, and a square block with a hole in the center is nailed to the bottom immediately beneath. A mast of pine or spruce wood, about three inches in diameter at the base and twelve feet high, is placed in the hole, and held in place by a wire stretching from its top to the bow of the boat. Such a mast will carry a boom or spar fourteen feet long, on which may be spread a triangular sail eleven feet high, and twelve or thirteen feet at the bottom.

The sail is attached to the mast by a number of sliding rings, and is hauled up and down by a rope passing through a pulley at the masthead. To give steadiness to such a boat, since it has no centerboard or keel, it is necessary to use a leeboard when sailing on the wind. This is a flat board hung over the lee side (the side away from the wind) and lashed securely in place. It keeps the boat from being blown sideways. The sail may be made of twilled duck or heavy unbleached muslin; seven or eight rings, sliding on the mast, will bring the sail up and down.

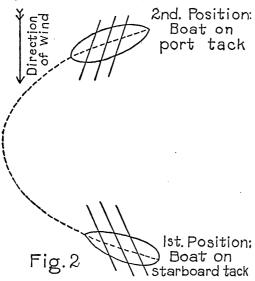
Sailing. It is easy to understand how a boat sails with a breeze behind it; it is not so easy to understand how it can be made to sail against the wind. As a matter of fact, however, a boat does not sail best with the wind straight aft; a breeze from the side is better. The accompanying diagram (Fig. 1) will give an

idea of what makes the boat go forward when the wind is on its beam. Here xy is the sail, and pd the wind. The wind blowing against the slanting sail is deflected, and causes a pressure, md, perpendicular to the surface. The pressure, md, can be resolved into two components, mf and fd. The former tends to push the boat sideways, but is largely counteracted by the push of the water against the boat's side; fd is in the direction of the ship's course, and propels it toward o.

Tacking. A vessel is said to be on the port tack, when the wind is on its port, or left side, and on the starboard tack, when the wind is on its starboard, or right side. When it comes up with its nose in the wind and changes from one tack to the other, it is said to be tacking. Fig. 2 shows the changed position which the sails of a vessel assume in changing from the star-

board to the port tack.

In tacking, the vessel's bows are pointed toward the direction from which the wind is blowing. The sail is almost parallel with the wind, and consequently falls slack. The boom is pushed across the boat, and the rudder is



[Explanation appears in the text.]

used to turn its nose sufficiently out of the wind, so there is an effective pressure against the sails. See Yacht and Yachting.

SAILOR KING. See WILLIAM (IV, England)

SAILOR'S CHOICE. See GRUNT.

SAINT, THOMAS. See SEWING MACHINE. SAINT AGNES. See AGNES, SAINT.

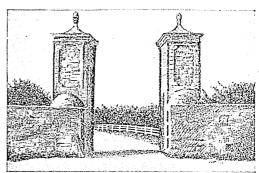
SAINT ALBANS, Mount, the site of the Cathedral of Saints Peter and Paul. See CATHEDRAL; WASHINGTON, D. C.

SAINT ANDREW'S CROSS. See Cross; FLAG (color plate, "The Sun Never Sets on the British Flag").

SAINT ANTHONY'S CROSS. See Cross. SAINT ANTHONY'S FALLS. See MINNE-APOLIS (Minn.)

SAINT ANTHONY'S FIRE. See ERY-SIPELAS.

SAINT AUGUSTINE, FLA., the oldest city in the United States, was founded by the Spaniards in 1565. A few of the buildings erected



OLD CITY GATE

The exact date of construction is not known, but from the earliest period of Saint Augustine's history some form of gate existed, for the defense of the settlement. The existing gate was repaired and put in substantially its present condition in 1809, the year of the Peninsular campaign of Napoleon in Spain. Soon after that date, the gate was closed and was not again opened for miscellaneous traffic until Florida was transferred by Spain to the United States, in 1819.

during the first century of its existence are preserved; chief among such structures are the old city gate and Castle San Marcos (Fort Marion).

The present Saint Augustine is a city of palms, and is notable as a year-round resort. Population, 12,000 (1940). See FLORIDA (map); COLONIAL LIFE IN AMERICA.

SAINT BARTHOLOMEW'S, bahr thol' omuze, DAY, MASSACRE OF. This massacre of French Protestants began in Paris early in the morning on the feast day of Saint Bartholomew, August 24, 1572. The massacre was the result of years of strife between the Roman Catholic and Huguenot (Protestant) parties in France. In 1570, however, a peace treaty was made, according to which Prince Henry of Navarre, a Huguenot leader and sympathizer, was to marry Margaret, the daughter of Catharine de' Medici and the sister of King Charles IX. The wedding festivities took place in Paris, about two years after the treaty, and a few days before Saint Bartholomew's Day; among the powerful Huguenot leaders who came to the city to attend them was Admiral Coligny. The admiral, who had considerable influence over the weak young king, roused the hatred and fear of the queen mother by attempting to draw her son away from her, and by trying to persuade the king to make war against Spain. Accordingly, she tried to have Coligny assassinated.

When this plot failed, Catharine, together with the Guises, uncles of the king and stanch Catholics, persuaded Charles that Coligny was a dangerous enemy, and induced him to sign a decree ordering the massacre of the Huguenots. He is reported to have said, "By God's death, since you insist that the admiral must be killed, I consent, but with him every Huguenot in France must perish, that no one may remain to reproach me with his death; and what you do, see that it be done quickly." A fanatical mob joined the executioners in Paris on Sunday, August 24, and the massacre was taken up in the provinces, but in many districts, public sympathy was so strong that the officers of the law dared not murder their innocent fellow citizens. The number who perished is variously given, estimates ranging from 2,000 to 100,000.

Related Subjects. The following articles in these volumes contain further information as to the Massacre of Saint Bartholomew's Day:

Catharine de' Medici Charles (IX, France) Coligny, Gaspard de France (History) Guise Henry (IV, France) Huguenots

SAINT BENEDICT. See Monasticism. SAINT BERNARD, bur nahrd', a breed of large dogs developed by the monks of the monastery of Saint Bernard, located in the

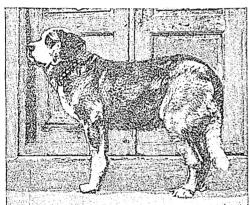


Photo: Visual Education Servi

SAINT BERNARD DOG

The dog shown here was attached for several years to the hospice of Saint Bernard, in the Swiss Alps. He saved the lives of more than a score of persons, and was slain by a frenzied man whom he was endeavoring to help.

Swiss Alps (see Saint Bernard, Great). This hospice is situated near a dangerous pass, and its inmates breed and train the dogs to rescue travelers lost in the snow and ice. So keen is the scent, and so remarkable the intelligence, of these animals that they have been the means of saving countless lives. Every day the monks send the dogs out to test passageways over dangerous chasms, trackless wastes of snow, and perilous glaciers. In their rescue work, they are aided by the keenness of their sense

of smell, which enables them to detect a body buried under several feet of snow. A flask of brandy is usually tied about each dog's neck for the benefit of half-frozen travelers, and the dogs call for help by prolonged barking.

The Saint Bernards are among the largest of domestic dogs. Fine physical specimens are almost three feet high, and weigh 180 pounds. The body is well built, erect, and muscular, the back broad, the legs large and strong, the head imposing, and the expression intelligent. Two varieties are seen, the smooth-coated and the long-coated. See Dog. W.J.

SAINT BERNARD, GREAT, a famous pass over the Alps, now noted chiefly for the hospice at its summit, about 8, roo feet above the sea. The hospice was founded in the eleventh century by Saint Bernard of Menthon, and has been maintained by the Augustine monks as a refuge for travelers. With the aid of their famous dogs (see SAINT BERNARD), the good monks save the lives of many wayfarers in the winter months. So severe is the life of the monks in the winter that only young men are chosen for this service. (See page 6304.)

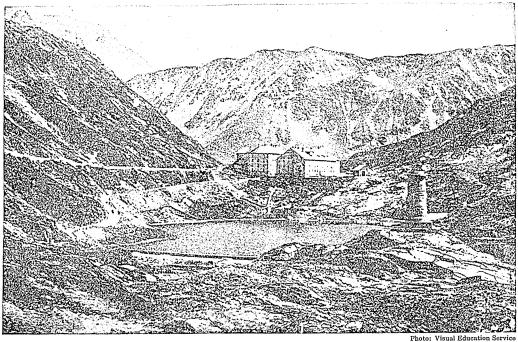
In the summer and autumn, many foreigners visit the hospice. It now has accommodations for over 300 people, but nobody is ever allowed to spend longer than one day there, except in the case of illness, injury, or terrible winter storms. The visitor announces his arrival by ringing a great bell which hangs in the entrance hall, and before its clanging echoes have died away in the distant corridors, a monk appears to ask his wishes. No payment is permitted for food and lodging, but every visitor is expected to place a contribution, according to his means, in a little box in the chapel.

From Martigny, Switzerland, an excellent motor road runs over the pass to Aosta, Italy, a distance of fifty-three miles. It was by this route, then only a bridle path, that Napoleon led an army of 30,000 men, with baggage and artillery, to invade Italy.

Saint Bernard, Little. About fifteen miles southwest of the Great Saint Bernard is another pass, the Little Saint Bernard. At its summit also is a hospice, founded and maintained as the other. It lies at a height of 7,170 feet above the sea, and is ten miles south of Mount Blanc, the highest peak in Europe. This pass is the easiest route by which the Alps may be crossed, and has a good motor road. Some historians state that Hannibal, in an expedition against Rome, crossed the Alps by way of the Little Saint Bernard.

SAINT BERNARD COLLEGE. See ALABAMA (Recreation and Out-of-Doors).

SAINT BONIFACE, Man., a city on the Red River, directly east of and opposite the city of Winnipeg. Six bridges connect the two cities. Saint Boniface is the county seat of Saint Boniface County, and the seat of the Roman Catholic archbishop of Manitoba.



THE SAINT BERNARD HOSPICE (SEE PRECEDING PAGE)

The population in 1921 was 12,821; in 1931, 16,305; and in 1941, 17,995.

Transportation. The city is served by the Canadian Pacific, by two lines of the Canadian National (now government-owned), and by The Soo Line (Minneapolis, Saint Paul & Sault Ste. Marie), which runs directly to Minneapolis and Saint Paul and other cities in the United States.

Industries. Saint Boniface is steadily growing in importance as a manufacturing center, the annual value of its products being approximately one-fourth of the value of Winnipeg's production, and a little less than one-sixth of the total for Manitoba. The principal manufactures are meat and meat products, flour, lumber, linseed oil, paints, and dyes. Here is operated one of the largest flour mills in the British Empire, and the stockyards, which were constructed and equipped at a cost of more than \$1,000,000, are among the greatest in Canada. Hydroelectric power, supplied by the Winnipeg River, is an important factor in manufacturing.

Institutions. The city has Saint Boniface College, affiliated with the University of Manitoba, a provincial normal school, Saint Adelard's Orphanage, the convent of the Sisters of Jesus, and the Juniorate of the Oblate Fathers.

SAINT CATHERINE LAKE. See Ver-MONT (Rivers and Lakes).

SAINT CHARLES, Mo. See Missouri (back of map).

SAINT CHRISTOPHER, better known as SAINT KITTS. See LEEWARD ISLANDS.

SAINT CLAIR, klair, a lake and a river connecting lakes Huron and Erie, and forming part of the boundary between the state of Michigan and the province of Ontario.

Lake Saint Clair. On account of its smaller size and lesser importance, Lake Saint Clair is not named as one of the Great Lakes, though it is a link in that

great system of waterways. It is roughly circular in shape, about twenty-five miles in length and width, and covers an area of over 460 square miles, of which 270 square miles are in Ontario. The lake's surface is six feet lower than that of Lake Huron, and three feet higher than that of Lake Erie. Its average depth is only nineteen feet, but it has been dredged over its entire area, so that vessels of deep draft can navigate it in safety. This protection to navigation has been made necessary by the enormous tonnage of shipping that passes from



LOCATION MAP The lake and river, with connecting bodies of water, and cities above and below.

Chicago, Milwaukee, Duluth, and Superior to Detroit, Toledo, Erie, Buffalo, and other ports. bed of the lake is covered with a blue mud, on which grows heavy vegetation, and it is stocked with many kinds of fish. The lake discharges through the Detroit River into Lake Erie.

Saint Clair River. This outlet of Lake Huron flows into Lake Saint Clair through a fan-shaped delta. The river and one of the seven channels of

the delta are navigable for large vessels. This channel, however, is canalized and protected by embankments. The land on both sides of the river is low and level, especially near the delta, which forms the famous Saint Clair Flats. On the islands formed by the river's channels are numerous summer cottages and hotels. Between Port Huron, Mich., and Sarnia, Ont., at the head of the river, is the tunnel of the Grand Trunk Railway (Canadian National), completed in 1891, which, with its approaches, is two

SAINT CLAIR, ARTHUR (1734-1818), a Scottish-American soldier and statesman, the first governor of the Northwest Territory, and commander in chief of the United States army in 1701. He studied

miles long.

medicine at the University of Edinburgh, inherited a fortune, and entered the British navy, sailing to America as ensign during the French

and Indian Wars. After taking part in the expeditions against Louisburg and Quebec, he resigned his commission as lieutenant (1762), and settled in Pennsylvania. Fourteen years later, in 1776, he joined the colonial army, organized the New Jersey troops, and fought at Trenton and Princeton. As a reward for gallantry, he was made



GENERAL SAINT CLAIR

a major general the following year, and was placed in charge of Fort Ticonderoga, but was deprived of command for surrendering to Burgoyne. Undaunted, he fought for the American cause as a volunteer, and again rose to distinction.

Saint Clair was elected to the Continental

Congress in 1785, became its president in 1787, and in 1789 was made the first governor of the Northwest Territory. Two years later, he was sent on an expedition against the Miami Indians, as commander in chief of the United States army, but his forces were disastrously routed (1791). Later he published an account of this expedition. In May, 1792, he resigned his command, and in 1802 Jefferson relieved him from the duties of the governorship. For eleven years he suffered the direst poverty, but Congress later rewarded him for previous services.

SAINT CLOUD, MINN. See MINNESOTA (back of map).

SAINT CROIX, kroi, one of the Virgin Islands of the United States (which see).

SAINT CROIX RIVER. See Maine (Lakes and Rivers).

SAINT DOMINIC, dom' ih nik. See Dominicans, subhead.

SAINTE ANNE DE BEAUPRÉ, bo pra', a shrine in Montmorency County, Quebec, which, since the first miracle was performed there in 1658, has been a Roman Catholic place of pilgrimage. Hundreds of thousands of ill and crippled men and women have worn pathways to the church and added to the huge store of crutches, which have given it the name, "the American Lourdes."

In the early days of French settlement, according to an old legend, a boatload of Breton sailors found themselves in danger on the Saint Lawrence. As the boat was tossed about by the waves, the frightened sailors prayed fervently to good Sainte Anne, patron saint of sailors. They vowed to erect a chapel in her honor, if they were saved. When the storm passed, the grateful men landed at the



Photo THE CHURCH AT SAINTE ANNE DE BEAUPRÉ

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junction of the Sainte Anne and Saint Lawrence rivers, a few miles northeast of the city of Quebec, and diligently raised a rude edifice, which, dating from 1658, was rebuilt and restored in 1878; it still stands as an object of great interest to all pilgrims. Near by, a new church was built in 1876, and was created a basilica eleven years later by Papal decree.

Fire, which originated in the pile of crutches left by cripples who had been cured at the shrine, destroyed the splendid church in 1922. The relic of Sainte Anne, which had been brought from France in 1670, the beautiful statue of the saint, with a sunburst of gold, and other precious relics were saved through the heroism of one monk. The church has been rebuilt. J.A.R.

SAINTE-BEUVE, sa Nt' buvv', CHARLES AU-GUSTIN (1804-1869), a French essayist, influential as a literary critic, was born at Boulogne-sur-Mer, and educated at Paris. He practiced medicine a short time, but by 1827 had written such excellent newspaper articles as to attract the attention of Victor Hugo, and the introductions to famous writers thus gained led him to devote his entire time to literature. wrote three volumes of highly finished but rather morbid poetry and one novel, Volupte, showing his religious unrest; but his fame rests upon more than fifty volumes of critical and biographical articles. A warm partisan of Napoleon III, he was chosen by the emperor as professor of Latin poetry at the Collège de France, but was so shamefully mistreated by anti-imperialist students that he resigned. His keen appreciation of the permanently good, his vast knowledge, and delicate, precise style place him among the leading literary critics in any language. R.T.H.

SAINT ELIAS MOUNTAINS, a broad chain with many peaks and ridges, extending along the southeastern boundary between Alaska and Canada. It gives off many prodigious glaciers, the largest being the Malaspina (see GLACIER). Rain falls almost every day on the lower slopes, and snow, on most days, above an altitude of 4,500 feet. Mount Logan, the highest point, rises to an altitude of 19,850 feet, according to the measurements of Professor Israel C. Russell, who named the peak in honor of the Canadian geologist, Sir William E. Logan.

Mount Saint Elias is next in height, towering 18,024 feet above the sea. The majestic beauty of the latter is best appreciated when viewed from the Pacific Ocean; the seaward slope, which is exceedingly steep, is covered with glaciers, and clothed from base to summit with snow. The mountain was discovered and named, in 1741, by Bering, a navigator in the Russian service, but was not explored until 1874, when the United States, which had purchased Alaska from Russia in 1867, sent an expedition to examine the glaciers encircling

the mountain. The first ascent to the summit was made in 1897, by the Duke of the Abruzzi. Other peaks of the chain are Mount Fairweather, Mount Cook, and Mount Vancouver. See Alaska (Physical Characteristics); Ber-ING SEA (Vitus Bering); LOGAN, MOUNT.

SAINT ELMO'S FIRE, the name given to an electrical appearance in the form of a circle of light, sometimes seen, especially in southern regions, during thunderstorms, about the masts of ships, at the tops of spires and trees, on the manes of horses, and occasionally about human heads. Among the Greeks, the phenomenon was the basis of the myth of Castor and Pollux (which see), and was regarded by sailors as a friendly omen. The origin of the name is uncertain, but it is probably an Italian corruption of Saint Erasmus, the name of a bishop whom Mediterranean sailors regard as their patron saint, and who was martyred in the year 304, during the reign of Domitian.

SAINT ETIENNE, saN tay tyen'.

France (Interesting Cities).

SAINT FRANCIS. See Francis of Assisi. SAINT FRANCIS, LAKE. See SAINT LAW-RENCE RIVER.

SAINT FRANCIS DAM, in San Francisquito Canyon, southern California, impounds part of the water supply for Los Angeles.

SAINT FRANCIS RIVER. See QUEBEC (Rivers and Lakes). Also, a tributary of the

Mississippi, in Missouri and Arkansas. SAINT GAUDENS, gaw' denz, Augustus (1848-1907), probably the greatest of American sculptors, and one who ranks among the world's Although Irish by

foremost plastic artists. birth, he expressed for his adopted countrymen their feelings and aspirations in the famous Sherman equestrian statue, Central Park, New York City; the Shaw Memorial, Boston Common; and two Lincoln statues in Chicago—one in Lincoln Park, and the other, the Seated Lincoln, in Grant Park on the lake front.

Saint Gaudens was brought to America from Dublin, when but six months old.



SAINT GAUDENS

He left school in New York City, at the age of thirteen, to work for a cameo-cutter, and he studied drawing at night in Cooper Institute. In his twentieth year, he went to Paris, where he studied for six years; later, he studied in Rome. His earliest work was a bronze bust of his father.

The young sculptor won immediate fame in 1880, when a noble monument entitled Admiral Farragut was exhibited at the Paris Salon. The figure of Governor Randall, for Sailors' Snug Harbor, Staten Island, was completed

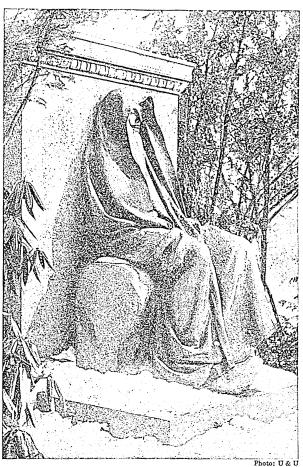
during this period. His work also includes the justly celebrated The Puritan for Springfield, Mass.: the Garfield monument in Philadelphia; and the *Lo*gan statue, a conspicuous figure in Chicago's Grant Park. The great Sherman monument, finished in Paris in 1897, was exhibited in plaster at the Exposition of 1900, and was unveiled in

The people of Saint Gaudens' art are human and lovable, and even the figure of *Grief*, in Rock Creek Cemetery, Washington, D. C., has so little of the repellent quality of sorrow that it has often been more appropriately called The Peace of God. It is a bronze figure, somewhat more than lifesize. seated on a granite rock against a wall of the same material.

It is muffled as if in unearthly garments, but the face is visible. The right hand is raised to support the chin, and the arm is exposed to the elbow. It is a strange, sphinxlike presence—the bald, bleak statement of the essential thing—the fact of grief. Saint Gaudens' low reliefs are famous for their exquisite delicacy, and here he had few modern rivals. Examples in this medium are the portrait plaques of Bastien-Lepage and Robert Louis Stevenson. He was commissioned by the United States government to furnish the designs for ten- and twenty-dollar gold coins, but his offerings were rejected because the centers were higher than the rims.

SAINT GEORGE, Cross of, has the same form as the Greek cross. See Cross.

SAINT GEORGE AND THE DRAGON, a legend of the patron saint of England. According to the story, as Saint George was riding



"GRIEF"

In this monument, in Rock Creek Cemetery, Washington, D. C., Saint Gaudens "set the mark of authentic individuality on a universal emotion. This figure is worthy to rank with the work of Michelangelo." To this specimen of his art, Saint Gaudens gave no name; admirers of the work named it.

across a marsh, he encountered a sad procession, led by a beautiful girl dressed in a bride's garments. She was the king's daughter, on her way to be sacrificed to a dragon which had terrorized the country for years. All the sheep on the land had been offered to it, and now lots were cast each day for human victims. Saint George addressed the people, promising them deliverance. Then, charging on the advancing dragon, he wounded it with his magic sword Ascalon, and called to the princess to bind the monster with her girdle. dragon immediately became weak and tame, and followed her to the market place in the city. There Saint George killed it with his magic sword, telling the people, as he did so, that it was done to show the

power of God. The people then gave up their idols and accepted Christianity, and the princess married the knight who had rescued her.

A painting of the slaughter of the dragon, by Raphael, is in the Louvre, Paris. Edward III of England made Saint George the patron of the Knights of the Garter, and a jeweled figure representing his slaying of the dragon is one of the insignia of that order. A Russian Order of Saint George was founded by Catharine II in 1769. See George, Saint, and illustration, page 6308.

SAINT GEORGE ISLAND, one of the Pribilofs. See Pribilof Islands.

SAINT GEORGE'S BAY. See CAPE BRET-ON ISLAND.

SAINT GEORGE'S CHANNEL, an arm of the Atlantic Ocean which separates Wales from the south of Ireland. It is about 100 miles long, and its width varies from 60 to 100 miles. It runs from Holyhead and Dublin to Saint David's Head, uniting the Irish Sea and the Atlantic Ocean.

SAINT GEORGE'S CROSS. See British

flag color plate, in article FLAG.

SAINT GER-MAIN, TREATY of. Modeled on the Treaty of Versailles, with only such changes as were necessary, the treaty between twenty-five allied and associated powers and the republic of Austria was signed at Saint-Germainen-Laye on September 10, 1919. Rumania and Yugoslavia objected to certain stipulations in the treaty about the protection of minorities within their separate states, and refused to sign it until several months later. The Allies were compelled to send a virtual ultima-

tum to Rumania before its representative consented to underwrite the treaty. It was ratified by the Austrian National Assembly on October 17, and went into force on July 16, 1920.

Clauses, sections, and even whole parts of the Versailles Treaty are repeated without change of a word. Part I is the Covenant of the League of Nations, with the admission of Austria dependent on good behavior. The boundaries of the new republic, as fixed in Part II, reduced its area from about 116,000 square miles to a little more than 32,000 square miles, and its population from 30,000,000 to approximately 6,000,000. Racial, religious, and linguistic minorities were protected by eight clauses, which guaranteed their independence and integrity.

Recognition of the complete independence of Poland, Yugoslavia, Czechoslovakia, and Hungary was one of the requirements, as well

as liberal cessions of territory to victorious neighbors. However, all transferred territories were made responsible for their fair shares of the prewar Austrian debt. Military clauses reduced the army to 30,000, and the manufacture of arms to a single factory. Naval terms seemed drastic, with the whole Austro-Hungarian navy broken up and distributed among the Allies, and only four patrol boats allowed for protection of inland waters; but the mainte-

nance of naval forces was obviated through the loss of maritime

ports.

M. Clemenceau secured the decision of the Allies to include a clause in the Treaty of Versailles and the Treaty of Saint Germain which forbade union between Germany and Austria, except with the unanimous consent of the Council of the League of Nations. In 1938, however, the Nazis forced a World union. War II nullified the treaty. See Austria; Ger-Many; Czecho-SLOVAKIA; World War I. II.

SAINT GOTTH-ARD, an elevated plateau in Swit-

zerland, situated in the Central Alps. The entire area of the plateau, or mountain group, is 644 square miles, of which about four fifths is Swiss and one fifth Italian. It is broken up by lofty peaks, and has a cross valley through which passes a famous Alpine road (see below). Monte Leone, the highest peak of the group, lying east of the Simplon Pass, is 11,604 feet in height. North of it are the Waserhorn, nearly as high, and the Bortelhorn. It is believed that the Saint Gotthard Mountains were named after a chapel of Saint Gotthard, built in the twelfth century. Here the Rhine, the Rhone, and other rivers have their source. See Switzerland (General Features).

Saint Gotthard Tunnel, a railway thoroughfare through the Saint Gotthard Pass in the Alps, connecting the railways of Northern Italy with those of Switzerland and Germany. The cost of construction, about \$13,000,000, was borne by these three countries.



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SAINT GEORGE AND THE DRAGON (SEE PRECEDING PAGE) [From the painting by Rubens. In the Prado, Madrid, Spain.]

Operations began in 1872, and the work was completed in 1880; at that time, the tunnel was the longest in the world. It is 91 miles long, 26 feet wide, 21 feet high, and reaches a height of 3,786 feet above sea level. It is arched with brick and lined with rough stones. Trains enter the passage by ascending through spiral tunnels from the valley below.

SAINT HELENA, hel e' nah, a British island in the Atlantic Ocean, 1,200 miles west of the African coast and 700 miles southeast of Ascension Island, the nearest land. Its chief claim to fame lies in its having been the enforced home of Napoleon Bonaparte, from 1815 until his death, May 5, 1821 (see BONAPARTE, NA-POLEON). Saint Helena was discovered in 1502 by the Portuguese, but it has belonged to Great

Britain since 1651.

The island is a rugged, mountainous mass, of volcanic origin, lonely and desolate, and surrounded by forbidding cliffs rising in places to a height of 1,000 feet. The only village and port is Jamestown, the capital, a fortified place lying at the mouth of a small mountain stream which flows into Saint James' Bay, an open roadstead. Less than one-third of the area of forty-seven square miles is available for cultivation, but a part of that is under grass, and is valuable for raising cattle and sheep. Markets, however, are lacking. The principal crop is potatoes, which are sometimes exported. With government help, factories for making fiber mats have been successfully established, and fish-curing and lace-making are carried on. The population consists of mixed Europeans, East Indians, and natives of Africa, and numbers 4,600 (1939 estimate). A detachment of Royal Marine Artillery is stationed here.

SAINT HELENS, Mount, a 10,000 foot volcanic cone in southern Washington.

SAINT HELEN'S ISLAND. See Montreal. SAINT IGNATIUS, ig na' shih us. See Ig-

NATIUS, SAINT; LOYOLA, SAINT IGNATIUS OF. SAINT JOHN, one of the Virgin Islands of the United States (which see).

SAINT JOHN, KNIGHTS HOSPITALERS OF.

See Knights Hospitalers of Saint John. SAINT JOHN, LAKE. See QUEBEC (Rivers

and Lakes).

SAINT JOHN, N. B., the county town of Saint John County, and the largest city of the province. It is on the southern shore, picturesquely located on a rock-ribbed peninsula overlooking the Saint John River and the Bay of Fundy. It is served by the Canadian Pacific and Canadian National railways, and by the Shore Line Railway from the United States border at Calais, Me. Saint John is 275 miles by rail northwest of Halifax. Population, 51,741 (1941).

The city's harbor operates under the National Harbors Board, as do all Canadian ports. The harbor and its approaches have a minimum depth of thirty-two feet at low tide, and are

never frozen over, a fact which has made Saint John "the winter port of Canada." The dry dock, one of the largest in the world, is an important shipbuilding and repair center.

Saint John is a distributing point for the three Maritime Provinces (which see) and the greater part of eastern Quebec. The leading manufactured products include brushware, refined sugar, cotton goods of many kinds, brass, iron, and steel products such as nails, engines, boilers, stoves and ranges, and axes. Lumber milling and woodworking constitute the largest single branch of manufacturing. Saint John is also an important brewing center.

Saint John was the first city in Canada to be incorporated (1785), and the first to adopt the commission form of government (1912). The charter of 1912 also provides for the initiative and referendum, and for the recall of

officials. See illustration, page 4911.

SAINT JOHN LATERAN, a famous church in the city of Rome, dating from the third century. The present structure is the fifth on its site, the former ones having been destroyed by fires and earthquakes. A part of Saint John Lateran of to-day survives from the fourteenth

century. See LATERAN.

SAINT JOHN RIVER, the principal waterway of New Brunswick, Canada. It is over 400 miles long, and has a drainage basin of 21,500 square miles. The Saint John has its source in a number of small streams which rise on or near the boundary between Quebec and Northwestern Maine. Flowing northeast, it crosses the northwest corner of Maine, then forms the boundary between Maine and New Brunswick. After it enters New Brunswick, it continues south for about seventy-five miles. and finally empties into the Bay of Fundy.

The Saint John is one of the most picturesque rivers in the Maritime Provinces, and, like the Hudson River, is often called the "Rhine of America." Three miles after it enters New Brunswick, it plunges over the Grand Falls, a precipice seventy-five feet high. For nearly a mile below the falls are rapids, in the course of which the river drops another seventy-five feet. The Saint John is navigable from its mouth to Woodstock, a distance of about 145 miles, and occasionally, at high water, to the Grand Falls, 225 miles from the river's mouth. Above the falls, the river is again navigable for forty miles.

The Reversing Falls. At Saint John, just before the river enters the Bay of Fundy, is the phenomenon known as the Reversing Falls. The river valley contracts into a narrow gorge, in which the river falls seventeen feet. At low tide, the river above the gorge is twelve feet higher than the water level in the harbor; then the current is downward. At high tide, however, the harbor level is five feet higher than the river, and the current through the gorge flows upstream. Thus, with every turn of the tide, the

rapids or falls are reversed, and only for a brief period, between the ebb and the flood, can the gorge be passed by steamers.

SAINT JOHN'S, the capital of Newfoundland, is situated on the eastern shore of the island, and is five miles from the most easterly point in North America, Cape Spear. From Saint John's to Cape Clear, on the coast of Ireland, is a distance of 1,640 miles; Saint John's is 1,000 miles nearer than New York to England. Population, 43,000 (1940 estimate).

In the grim cliffs on the Atlantic coast of Newfoundland, a narrow opening suddenly presents itself, as if the rocky wall had been torn apart by an angry god for the sea to rush in. Two hills, Signal and South Side, guard the entrance, an opening 1,400 feet wide. The Narrows are nearly half a mile long, and must be traversed two-thirds of the way before the city comes into view. A gradual slope on the northern side of the harbor is the site of Saint John's. Batteries and forts, placed on wooded hills, command the entrance to the harbor, and effectively protect this thriving seaport.

On a high crest, overlooking the city, is the Roman Catholic Cathedral, an imposing building. It can be seen from the Narrows. Cabot Tower, on Signal Hill, dedicated to John Cabot, discoverer of Newfoundland, is famous as the place from which Marconi sent his first wireless message across the Atlantic to Ireland. From the tower there is a splendid view of the ships lying at anchor in the harbor, or moored at the piers. Masts of fishing boats rise row upon row, and here and there, a white sail dots the blue water. Bowring Park, a reservation of great natural beauty and little artificial development, is about three miles from the city. The Colonial Building in which are housed government offices, and the Anglican Cathedral are important buildings.

Saint John's is not an incorporated town, but is governed by a mayor and six councillors who are elected by ratepayers. Education is controlled by the various churches, aided by

government grants.

As the center of industry in Newfoundland, Saint John's has manufacturing plants in connection with equipment for fishing vessels, rope, paints, varnishes, oilcloth, and soaps. Some raw material is imported from England and the United States, and manufactured into boots and shoes, tobacco products, furniture, and clothing. Excellent docks and warehouses are provided, and a large dry dock is available Three steamship lines provide for repairs. freight and passenger service between the United States and Newfoundland's capital; one steamship company operates on a regular schedule between Liverpool and Saint John's; two companies furnish steamship connections with Montreal; and the Newfoundland Government Railway owns steamships.

Hardy Devonshire fishermen ventured across the Atlantic as early as 1500, and founded Saint John's. As the outlet of a valuable codfishing district, the village was prized by the French and the English, and from 1697 until 1762, the place was held alternately by each country. In the course of the struggle, the seaport suffered complete destruction twice. By the Treaty of Utrecht (1713), Newfoundland was ceded to England, and Saint John's remained the capital of the "senior colony". The harbor proved an incomparable base for the British fleet during the War of Independence and the War of 1812, and many a hapless American vessel disappeared from the high seas and was securely held in Saint John's harbor. The indomitable citizens have rebuilt the city three times, after disastrous fires. Since the fire of 1892, modern fireproof construction has been used for the buildings.

SAINT JOHN'S BREAD. See CAROB. SAINT JOHN'S COLLEGE. See MARYLAND (Education).

SAINT JOHN'S RIVER. See FLORIDA, illustration.

SAINT JOHN'S UNIVERSITY, a Roman Catholic school for men, Collegeville, Minn.

SAINT JOHN THE DIVINE, CATHEDRAL OF. See CATHEDRAL; also, New York City (Churches).

SAINT JOSEPH, Mo., situated in the extreme northwestern part of the state, on the Missouri River, is the county seat of Buchanan County and the third largest city of the state, being surpassed only by Saint Louis and Kansas City. It is sixty miles north and west of Kansas City, 125 miles west of the geographical center of population, and 300 miles northwest of Saint Louis. Population, 75,711 (Federal census of 1940).

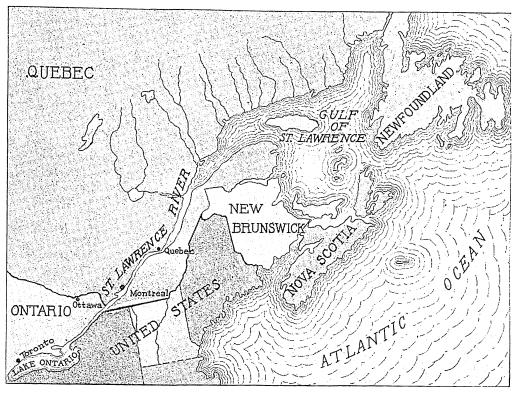
The city is built upon a somewhat hilly site in the heart of the midcontinent fruit district. It has an area of nearly fourteen square miles. Among its attractive features are a beautiful boulevard and parkway system, over 800 acres of park land, and a fine Junior College. Here also is located one of the state hospitals for

the insane.

Transportation. Railroad lines entering the city are the Atchison, Topeka & Santa Fe, the Chicago, Burlington & Quincy, the Chicago Great Western, the Chicago, Rock Island & Pacific, the Missouri Pacific, and the Union Pacific. There are also numerous motorbus lines which furnish both local and transcontinental connections out of the city. All of the important county roads leading into Saint Joseph are hard-surfaced thoroughfares. The city maintains a government-recognized aviation field.

Industry. Saint Joseph is a leading center for the manufacture of school and writing tablets, white and pancake flour, and candy, and is also noted as a dry-goods, hardware, and livestock market. It is one of the principal American cities in primary grain

receipts.



SAINT LAWRENCE RIVER AND GULF

History. Joseph Robidoux, a fur trader from Saint Louis, established a trading post on the site of Saint Joseph in 1826, and traded with Indian trappers there. He named the settlement, which was organized as a village in 1845, and incorporated as a city in 1851. In history it is known as the eastern terminus of the "Pony Express" (which see).

SAINT JOSEPH RIVER, a picturesque

SAINT JOSEPH RIVER, a picturesque stream of southwestern Michigan (see map).

SAINT KITTS. See LEEWARD ISLANDS.

SAINT LAWRENCE, GULF OF, a deep, circular inlet of the Atlantic Ocean. With the exception of the Gulf of Mexico, it is the largest gulf on the North American coast. This important body of water is partly enclosed by Newfoundland on the east, and Nova Scotia and New Brunswick on the south, and it washes the eastern shores of Quebec (see map under Canada). As the outlet of the Saint Lawrence River and the Great Lakes, the chief highways of trade of Eastern Canada and Northern United States, its commercial importance can scarcely be overestimated. It is the gateway to the great trans-Atlantic trade of Canada, and affords the shortest route to Liverpool. By the way of Belle Isle Strait, between Newfoundland and Labrador, the voyage from Montreal to Liverpool is 2,760 nautical miles, while from New York it is 3,053 nautical miles. The

gulf enters the sea by two other deep channels; these are Cabot Strait, over sixty miles wide and the largest outlet, between Cape Breton and Newfoundland; and Canso Strait, separating Cape Breton and Nova Scotia.

The gulf is crossed by cables, and many steamers ply between Quebec and the Maritime Provinces. The tides are low, but the changing currents, dense fogs, and floating ice often endanger shipping. Besides Prince Edward Island, in the south, and Anticosti Island, near the mouth of the Saint Lawrence River, there are several clusters of smaller islands, especially in the southern part of the gulf, and tiny islets fringe the bold and rocky northern shores. The large cod, herring, mackerel, and smelt fisheries of the gulf have been the chief means of livelihood to a large part of the population of these islands and the mainland coast.

The Gulf and River of Saint Lawrence were discovered by Jacques Cartier. On his second voyage, in 1536, he entered a bay on the north coast of the gulf on the tenth of August, the feast day of Saint Lawrence, and called it the Baye Sainct Laurens. This name gradually began to be applied to the entire gulf and river. See Saint Lawrence Waterway; Saint Lawrence River.

SAINT LAWRENCE ISLANDS PARK. See Saint Lawrence River. SAINT LAWRENCE RIVER, a majestic stream which, with its tributaries, drains the basin of the Great Lakes and the southeastern part of Canada. Its basin exceeds 500,000 square miles in area, and includes the largest bodies of fresh water in the world. The Saint Lawrence is the largest (but not the longest) river of Canada, and one of the largest rivers of the world; some authorities estimate that, in the volume of water discharged, it is second

only to the Amazon.

The river begins at the outlet of Lake Ontario, whence it flows in a northeasterly direction until it enters the Gulf of Saint Lawrence, about 750 miles distant. The original source of this vast river system, however, is the Saint Louis River, which rises in the northeastern part of Minnesota and enters Lake Superior at Duluth. The Saint Mary's River joins Lake Superior to Lake Huron, the Saint Clair and Detroit rivers connect Lakes Huron and Erie, and "the waters of Niagara shake the earth" between Erie and Ontario. It has been well said of the Saint Lawrence—

"The Great Lakes are its camping grounds, where its hosts repose under the sun and stars in areas like those of states and kingdoms."

The chief tributaries from the north are the Ottawa, whose dark flood enters the clear waters of the main stream at the island of Montreal; the Saint Maurice, noted for its high falls; the Montmorency, famed for its cascade; and the Saguenay, equaled by no other American river east of the Rocky Mountains in the grandeur of its scenery. From the south, the Saint Lawrence receives the Saint Regis, whose sources are in the foothills of the Adirondacks; the Richelieu, the outlet of Lake Champlain; the Chaudière, whose beauty attracts many visitors; and a number of other streams of less importance.

General Description. The average width of the Saint Lawrence from Lake Ontario to Quebec is one and one-fourth miles. In some places, it narrows to less than a mile, but in others there are broad expanses forming Lake Saint Francis, thirty miles above Montreal and twenty-eight miles long, and Lake Saint Peter, twenty miles long and about midway between Montreal and Quebec, are the most important of these. Below Quebec, the channel begins to broaden into the great estuary that blends with the Gulf at Anticosti Island. Nowhere below the Isle of Orleans is the channel less than ten miles wide. At the Saguenay, it has a width of twenty-five miles, and opposite Gaspé, the distance from shore to shore is fifty miles.

The Great Lakes are settling basins for the streams flowing into them, and consequently the waters of the Saint Lawrence are remarkably clear and pure. There is an abundant

rainfall over the entire basin, but, owing to the equalizing effect of the lakes, whose level changes but little during the year, the river is not subject to sudden rises, and disastrous floods along its course are unknown, with the exception of occasional overflows in the spring, due to the obstruction of the channel by ice.

The fall from Lake Ontario to Quebec is 240 feet. Most of this is above Montreal, and between the lake and that city there are a number of rapids, whose total length is about thirty miles. The tide ascends the river as far as the Saint Maurice, where, at spring tide, the water may rise a maximum of nineteen feet. The

rise at Quebec is nearly as great.

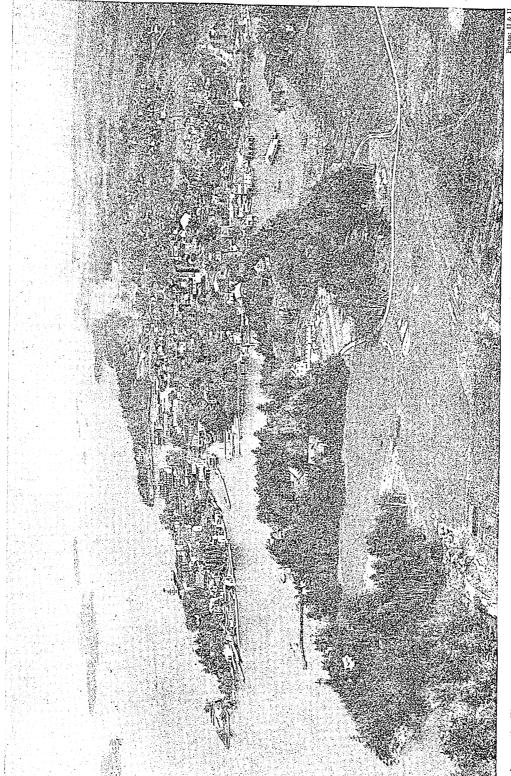
From Lake Ontario to Quebec, the Saint Lawrence flows through a region of low hills and fertile plains. Its valley is broad and beautiful, with now and then an isolated peak of the Laurentian or the Green mountains to break the monotony of the sky line. The elevation of the north bank above Quebec terminates in the bold bluff upon which the city is built. Below Quebec, the bluffs on the north shore merge into hills; the hills, in turn, merge into mountains which culminate in Cap Tourmente, towering 2,000 feet above the water. The south shore is low, and ascends gradually to a range of low hills in the distance.

The Thousand Islands. For a distance of forty miles after leaving Lake Ontario, the river has a width of from four to seven miles, and scattered over this area are about 1,700 islands; some are several acres in extent, while others are mere points of rock. Many of the islands are private property, on which wealthy Canadians and Americans have built beautiful summer homes, not a few in the form of medieval castles of most picturesque appearance. The scenery of the islands, with their precipitous rocks and shady groves, is beautiful, and the climate is healthful, offering almost ideal living conditions in summer.

The waters of the Saint Lawrence run swift and clear past the islands, which are near the famous rapids. There are large hotels, which are regularly visited by steamers. Alexandria Bay, the largest town in the park (see below), is a noted summer resort. The islands were formed by a spur of the Laurentian highland, which extends from Ontario southward across the Saint Lawrence River into the state of New York.

The Saint Lawrence Islands Park consists of twelve reservations among the islands, which are set apart as places of outdoor recreation and rest for the public. Pavilions and open-air stoves have been provided for the convenience of campers, and caretakers see that the grounds are kept clean and attractive.

The Rapids. The descent of the river before reaching Montreal is made chiefly by a series of rapids, which are caused by the outcropping



Among the Thousand Islands. A view of Alexandria Bay, from the air. This is one of the most delightful spots in all the course of the Saint Lawrence River.

of irregular layers of rock in the bed of the stream. The most noted rapids are the Long Sault, the Cedars, the Cascades, and the Lachine, just above Montreal. In each the water rushes down a rocky slope and is broken into waves, whirling eddies, and masses of spray. Excursion steamers make daily trips from Kingston to Montreal during the summer, and thousands of tourists experience the thrill of "shooting the rapids." Since the boat must pass through a tortuous channel at a terrific speed, the piloting of these steamers requires unusual skill and nerve. But the boats are constructed especially for running the rapids, and accidents are almost unknown. around each of the rapids are used by the boats on the return voyage, and also by freight boats in both directions.

Navigation. The largest ocean vessels have always been able to ascend the river to Quebec, and by dredging the shallow places in the channel, the river has been made navigable for them as far as Montreal. Steamers from the Great Lakes, not drawing over fourteen feet of water, make regular trips to Montreal during the open season, by using the Welland Canal and the canals around the Saint Lawrence rapids.

A project for a Great Lakes-Saint Lawrence waterway is well advanced in the United States and Canada. Where navigation is now impeded, it is proposed that, by a system of new canals, the largest ocean vessels shall have access to lake ports. The scheme, if carried out, will require years to bring to completion

(see SAINT LAWRENCE WATERWAY).

History. The Saint Lawrence River was discovered and named by the French explorer Jacques Cartier, in 1536. The Indians described it as the "river without end." Cartier extended his explorations as far as the island of Montreal, where he found the Indian town of Hochelaga. The broad channel extending westward led him to believe that he had found a possible water route to the western sea.

Related Subjects. The reader is referred in these volumes to the following articles:

Cartier, Jacques Great Lakes

Montreal Saint Lawrence, Gulf of

SAINT LAWRENCE WATERWAY, a project for constructing a continuous deep channel from Lake Superior to tidewater by way of the Saint Lawrence, which, if carried to completion, will bring the central and western parts of the United States and Canada 1,000 miles nearer Europe.

In 1920 the United States and Canadian governments requested the International Joint Commission, which had been created by the Treaty of 1909 and has jurisdiction over boundary waters, to investigate what further improvements were necessary in the upper Saint Lawrence in order to secure the maximum efficiency

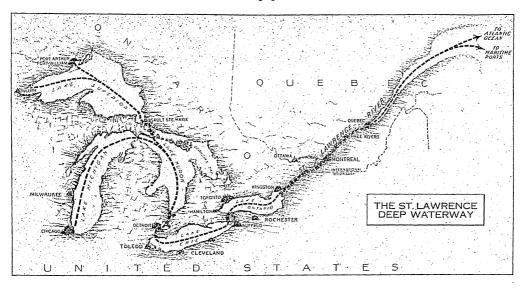
either in navigation alone or in a combination of navigation and water-power. The Commission, made up of six members, three from each country, held at least forty hearings in the United States and Canada, and studied the question for over a year. In its report to the two governments, issued in 1921, the Commission recommended two combined plans as desirable and feasible, but, because of the magnitude of the problem, suggested further investigation. Accordingly, the United States and Canadian governments each named three leading engineers on a joint board of six members, and appointed an advisory committee to the respective governments to deal with the economic side of the problem. Herbert Hoover headed the American committee.

The board and the committees having confirmed the judgment of the Commission, direct negotiations were begun April 13, 1927, and continued for several years. Finally, on July 18, 1932, a treaty for the construction of the waterway and power dams was signed at Washington, by representatives of the United States and Canada. Official ratification awaited action by the United States Senate and the Canadian

Parliament.

Details of the Waterway. To make 183 miles of the Saint Lawrence River available for deepdraft shipping, three sets of rapids must be circumvented. One section extends over one hundred and ten miles of river along the international boundary, and the other two sections, which are shorter but more abrupt, are within The existing fourteen-foot canals, Canada. constructed by Canada and located wholly on the Canadian side of the river, already provide for navigation throughout the entire reach of the Saint Lawrence River. The treaty provides for the replacement of this system by twenty-seven foot channels. Important terms of the treaty are: the work of overcoming the fifty-mile International Rapids Section and the sixty-mile Thousand Islands Section will be shared by the two countries; and a temporary commission will be created for the purpose of constructing the works in the International Rapids Section. The total cost of the project is estimated at \$543,429,000, of which the United States' share is \$272,453,000. Canadian share is \$270,076,000, of which \$128,-000,000 has been expended on the Welland Ship Canal, built across twenty-seven miles of land between Lake Erie and Lake Ontario, around Niagara Falls. The locks will be constructed with thirty feet of water on the sills while the channels will be dredged to twenty-seven feet at the outset. Further deepening of the channels can be proceeded with if and when desired.

The project contemplates navigation principally, but includes provision for 5,000,000 horse power of electric energy, of which



DETAILS OF THE GREAT LAKES-SAINT LAWRENCE WATERWAY

Designed to give lake cities and their tributary areas access to the sea by deep-draft vessels. Major improvements contemplated are in the Saint Lawrence between Kingston and Montreal, designed to combine a deep waterway with power development. Alternative routes proposed are from Chicago to the Mississippi and from Lake Erie to the Hudson.

2,200,000 horse power would be in the international section. The United States would control 1,100,000 horse power, which in turn would furnish power for New England, New York state, and New York City. The cost of this hydroelectric development is carried by the province of Ontario in Canada and by the state of New York in the United States.

The construction of the Saint Lawrence waterway would make seaports of cities like Buffalo, Duluth, and Chicago in the United States, and Kingston and Toronto in Canada. It is estimated that eighteen states would benefit, and \$80,000,000 would be saved per annum in transportation costs.

In both countries, opinion is divided about the treaty for the waterway. The opposition in the United States has centered around the questions of navigation, rates, and transportation, but in Canada it has centered around the question of power. The Canadian Constitution, broadly speaking, gives Federal authority jurisdiction over navigable streams for purposes of transportation, and provincial authority for development of water power. Though a compromise was reached in 1932, the United States Congress later refused to ratify the treaty. Interest revived in 1940, and President Roosevelt announced that he would strongly support the project as a defense measure.

SAINT LAZARUS, ORDER OF, a religious order founded in Jerusalem about the middle of the twelfth century, for the purpose of caring for sick pilgrims, especially lepers. Branches were established in various parts of Europe,

but the most important center was at Boigny, France. The order was later merged in that of Our Lady of Mount Carmel.

SAINT LEGER, lej' ur, or sil' in jur, BARRY (1737-1789), a British soldier who served in the Revolutionary War in America and in the French and Indian Wars. Entering the Army in 1756, he was sent to America, serving under Abercrombie, and under Wolfe at Quebec. In the campaign of 1777, Saint Leger, then lieutenant colonel, was sent with an expedition to capture Fort Stanwix with the assistance of Sir John Johnson and his Indians, and fought the Battle of Oriskany against General Herkimer, who was mortally wounded in the action. A few days later, General Benedict Arnold drove Saint Leger's men toward Canada in disorder, and for the rest of the War, the latter confined himself to guerrilla operations on the border.

Because of Saint Leger's failure at Oriskany, and the flight of his men from Arnold's approaching forces, the British campaign, as planned, had to be materially altered. The unfortunate officer was not considered by the British military authorities to be to blame for his failures; he was neither dismissed nor reduced in rank, but, on the contrary, in 1780 he was promoted to the rank of colonel. At the close of the War, he was commandant of all the British forces in Canada. He published a Journal of Occurrences in America, which recounted his difficulties. See Revolutionary War in America.

SAINT LOUIS, saN loo e', the capital city of Senegal (which see).



AINT LOUIS, saint loo'is, Mo., chief city of the state, and eighth in the United States, is on the Mississippi River, eighteen miles below the point where the Missouri River flows into the larger stream. Chicago is about 280 miles northeast; New Orleans, 709 miles south; and Saint Paul, 600 miles north. Saint Louis has become a great commercial and industrial center by reason of its location in the heart of the fertile agricultural region of the Mississippi Valley, and because of its vast network of railroads, highways, and airways, which give it unsurpassed facilities for transportation. Population, 816,048 (1940).

General Description. Saint Louis commands

General Description. Saint Louis commands a river frontage of nineteen miles, and the distance across the city at its widest part is nearly seven miles. Toll bridges and also the Municipal Bridge connect with Illinois cities such as East Saint Louis, Alton, Venice, Granite City, and Belleville. On the Missouri side are handsome residential suburbs, including Kirkwood, University City, Webster Groves, and Clayton. The great Eads Bridge is one of the world's busiest bridges. Although built more than half a century ago, it is still, as Baedeker has said, "deservedly one of the lions of the city." It has three spans, over the water, of 500 feet each, and its total cost was \$6,500,000 (see Eads, James Buchanan).

The business section of the city is built at about the center of the river front, thirty-seven blocks of which are being converted into a great memorial to Thomas Jefferson and the early pioneers. It extends between Broadway, five blocks from the river, and Twelfth Street, and includes department stores, retail and wholesale business houses, offices, theaters, and hotels. The streets in this section, with few exceptions, are narrow, permitting only oneway traffic. In the last few years, the enormous undertaking of widening Olive Street, one of the main business arteries, has been completed. Buildings too large to be moved back were cut off and refaced. Market Street and Natural Bridge Road have also been widened and improved.

The more exclusive residential districts are west, though there are attractive homes in the south and north sections, and everywhere there is evidence of civic pride in the appearance of the dwellings. The city is fan-shaped, and there are six principal boulevards extending like huge crescents across the city, connecting north with south; these are Broadway, Seventh, Jefferson, Grand, Kingshighway, and Union.

Jefferson, Grand, Kingshighway, and Union.

Homes, Parks, and Boulevards. Because over 30 per cent of its families are homeowners, Saint Louis is known as a city of homes, detached houses and duplex buildings being the rule. Modest bungalows and palatial mansions dot the residential districts. The spacious grounds of the exclusive districts reflect the skill of landscape gardeners. Forest Park, the largest of the city's recreation grounds, is a tract of 1,400 acres of great natural beauty. Here, in 1904, the Louisiana Purchase Exposition was held; in 1914 it was the scene of a great historic pageant. The park contains the Art Museum, the Jefferson Memorial Building, and a "zoo" rated as one of the two finest in the world. The Municipal Open Air Theater, especially devoted to light opera, has a seating capacity of 10,000 of which 1,700 seats are, by law, kept free to the public at all performances. Many historical relics are housed in the Jefferson Memorial, including the trophies of Charles A. Lindbergh.

The Missouri Botanical Garden, better known as Shaw's Garden, ranks first in the United States and next to the celebrated Kew Gardens, in London, as an educational botanical garden. It contains the largest collection of plant life in the Western Hemisphere. There is a city garden of seventy-five acres and an outof-town arboretum of more than 1,625 acres. The city garden conservatories contain more than 11,000 species of plants from all parts of the globe. A varied collection of tropical plants, chrysanthemums, orchids, desert cacti, and Australian, Philippine, and Japanese plants may be seen here. This Garden and Tower Grove Park were the gifts of Henry Shaw, a Saint Louis citizen, who was deeply interested

in plants; his burial place in the Garden is marked by an imposing sarcophagus. Lafayette, Lyon, and Compton Hill Reservoir parks are among the smaller recreation spots and playgrounds. In some one of the parks, a concert may be heard any night during the

warm season, as Saint Louis is a music-loving community. Bellefontaine and Calvary are the largest and most beautiful of the city's cemeteries; the latter is the burial place of General William Tecumseh Sherman.

Tower Grove Park, on the South Side of the city, has beautiful drives and statues of Columbus, Humboldt, and Shakespeare. Near the statue of Shakespeare are two trees which were planted by the English actresses. Adelaide Neilson and Olga Nethersole, as tributes to their illustrious countryman. Fairgrounds Park, on the North Side, has one of the largest artificial swimming pools in the United States. These parks, with Carondelet and Fairground, are on a chain of fine drives which include Kingshighway, Union, Long-

fellow, Hawthorne, Lindell, and Forsythe boulevards.

Ten miles north of the city is the beautiful Chain of Rocks Park, the location of the municipal waterworks system. Here the muddy water of the Mississippi is made pure for drinking purposes. A new system, located on the Missouri River, was completed in 1929.

Transportation. Of the twenty-three railroads terminating in the city, nineteen are

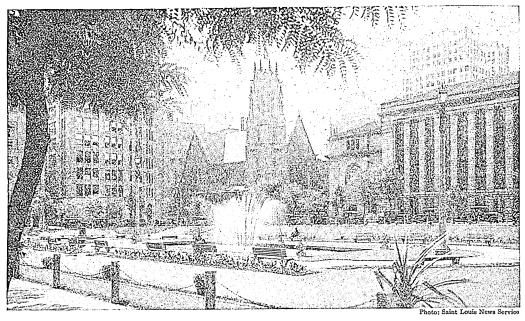
trunk lines. Communication with all parts of the country, and with Canada and Mexico, is afforded by the following railway lines, and their various connections: the Baltimore & Ohio; the Chicago, Burlington & Quincy; the Alton; the Chicago & Eastern Illinois; the Chi-

"THE WEDDING OF THE RIVERS" FOUNTAIN Near the Union Station, in St. Louis, stands this huge fountain depicting the Mississippi (left) coming to claim the Missouri (right).

cago, Rock Island & Pacific; the Chicago & North Western; the Cleveland, Cincinnati, Chicago & Saint Louis; the Frisco Lines; the Illinois Central; the Illinois Terminal System; the Louisville & Nashville: the Missouri, Kansas & Texas; the Missouri Pacific; the Mobile & Ohio; the New York, Chicago & Saint Louis; the Pennsylvania; the Saint Louis Southwestern; the Southern; and the Wabash railroads. All railroad trains "back in" to the Union Station, one of the largest unified passenger and freight terminals in the world. Trains from the East enter the city over the Eads, Merchants', and Municipal bridges. Electric lines, operated by the Illinois Terminal Railroad, communicate with nearby localities in Illinois. They enter Saint Louis over the

McKinley Bridge and terminate at the Illinois Terminal Building on North Twelfth Street. The Municipal Bridge between Saint Louis and East St. Louis, Ill., is one of the largest doubledeck, steel-span bridges in the world. Bargeline services operate on the Mississippi, to the north and south and up the Missouri to the west.

Commerce and Industry. Saint Louis stands ninth among the cities of the United States in value of manufactures, which include shoes.



A BEAUTY SPOT IN THE HEART OF SAINT LOUIS

This view in the business district of the city shows the Public Library on the right; Shell Building on the left; Christ Church Cathedral in center; Missouri Pacific Building, appearing above the library on the right; and Civil Courts Building above the library on the left.

drugs, bricks, terra cotta, macaroni, stoves, ranges, enamel ware, and electric street cars. The city is the largest primary market for American raw furs, and ranks among the leading cities of the country in the manufacture of tobacco. Saint Louis is also a great grain and livestock market, and conducts an immense wholesale trade in bags, carpets, coffins, doors, chemicals, trunks, sugar-mill machinery, openhearth steel castings, and lumber products. Here are also located the world's largest small arms ammunitions plant and gun turret factory, in addition to two aircraft plants and about 200 defense materials plants.

Education and Institutions. Among the institutions for advanced education are Washington University and Saint Louis University (Catholic). Additions to Washington University include an endowment of \$1,500,000 and

new buildings for the medical, art, biological, and other departments. Barnes Hospital, in connection with the university, is nationally famous. James Campbell also left an estate of \$10,000,000 to Saint Louis University for the advancement of medicine and surgery. The Jefferson Memorial, costing \$500,000, was built for the Missouri Historical Society from the surplus funds of the Louisiana Purchase Exposition. Kenrick Seminary (Roman Catholic) and Concordia Theological Seminary (Lutheran) are theological schools for men. Saint Louis also has numerous professional schools and technical institutions. The Saint Louis College of Pharmacy is one of the oldest and most important institutions of its kind. The David Ranken, Jr., School of Mechanical Trades ranks especially high in its own field. The Religious Order of the Sacred Heart and the Sisters of

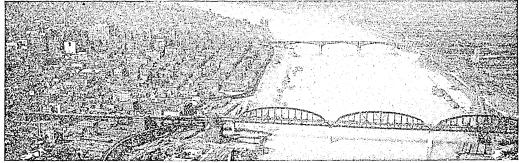


Photo: James Sawders

THE MUNICIPAL (foreground) AND EADS (background) BRIDGES ACROSS THE MISSISSIPPI RIVER

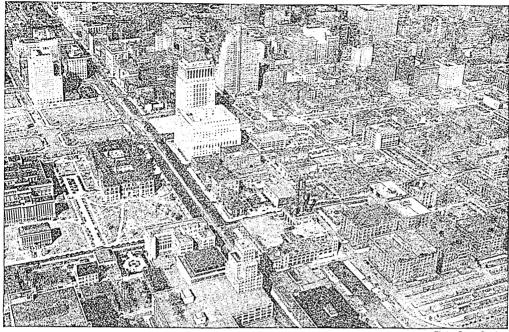


Photo: James
AN AERIAL VIEW OF DOWNTOWN ST. LOUIS

Saint Joseph each have colleges for women.

The first permanent kindergarten in connection with American public schools, and the first public kindergarten-training school for teachers, were established here in 1873 by W. T. Harris, superintendent of public schools, who later became United States Commissioner of Education.

The Saint Louis Cathedral on Lindell Boulevard is an imposing structure, and contains beautiful mosaics. Christ Church (Episcopal Cathedral) is an artistic building containing some fine stone carvings.

Civic Buildings. Most notable among the business buildings of the city are the Southwestern Bell Telephone building, thirty-one stories high; the Civil Courthouse; the Municipal Auditorium; the new Federal building; and the Railway Exchange, occupying an entire block. Other prominent structures are the Federal Reserve Bank, headquarters of the Eighth Federal Reserve District, and the Paul Brown and the Arcade buildings. One of the finest municipal markets in the country is located on Broadway, near the downtown shopping district.

History. The Saint Louis of today is the outgrowth of a fur-trading post established in 1764. Pierre Laclede Ligueste formed a settlement here which was first called Laclede's Village, but which soon after was renamed in honor of Louis IX of France. In 1770 France ceded all of its territory west of the Mississippi River to Spain, and Saint Louis became the capital of Upper Louisiana. In 1800

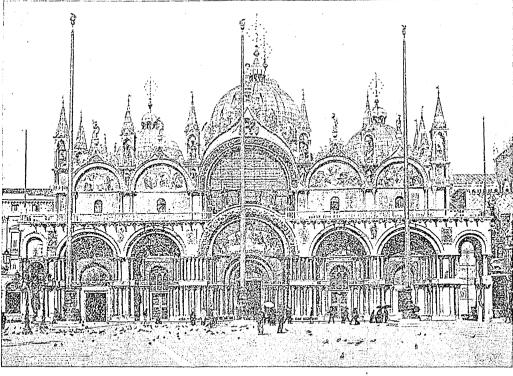
Spain retroceded Louisiana to France, which in turn transferred it in April, 1803, to the United States. On this memorable day, the citizens of Saint Louis floated three flags, representing the three countries. General Ulysses S. Grant married and lived here prior to the War of Secession.

One of the greatest calamities in Saint Louis history was a tornado, occurring in 1896; though it lasted less than twenty minutes, in that brief time it destroyed several hundred lives and swept away \$10,000,000 worth of property. Even greater property loss was suffered in a tornado that swept over the city in September, 1927, but fewer lives were lost.

The great fair held in 1904 commemorated the acquisition of Louisiana Territory by the United States. In 1914 a great historical pageant was given in Forest Park, and was attended by more than 100,000 people. The spectacular parade and ball of the *Veiled Prophet*, which have been held annually in October, since 1878, attract large numbers of visitors to the city.

Saint Louis is sometimes referred to as the "Mound City," because of the groups of nearby mounds that were built by prehistoric races. The largest mound, at Broadway and Mound Street, was cut down in 1859, and many relics of a previous age were unearthed.

The first trans-Atlantic airplane flight (from New York to Paris in May, 1927) was sponsored by Saint Louis business men, who made it possible for Colonel Charles A. Lindbergh



EXTERIOR VIEW OF SAINT MARK'S CATHEDRAL (SEE NEXT PAGE)

(which see) to make his spectacular journey in The Spirit of Saint Louis.

Ouestions on Saint Louis

(An Outline suitable for Saint Louis will be found with the article "City.")

In what way is Colonel Charles A. Lindbergh associated with the city of Saint Louis?

When did the city float three different national flags in one day, and why?

How many cities in the United States

are larger than Saint Louis?

How does it compare in size with the one that ranks next above it? With the one that ranks next below it? See list in article CITY.

What great exposition was held in Saint Louis? Why was there a special fitness in having it in this city? What disaster has Saint Louis twice

suffered? What was the first settlement on this site named? In whose honor was the city given its present name?

What special advantage would a student of botany have in Saint Louis that he would not find in any other city in the United States?

How does the Union Station in this city rank with the railway stations of the country as to size?

Name several outstanding buildings in Saint Louis. Describe the Civic Center.

Where may you see two trees planted by English actresses, and in whose honor

by English actiosses, were they planted?
On what part of the city site was the region given over to-day?

What is the largest of the recreation grounds of Saint Louis? How does it compare in area with the largest park in Chicago?

Why would this city have almost as good a right as has Philadelphia to be called a "city of homes"?

What is the most imposing religious

structure in the city?

Where are some of the finest stone carvings in the United States to be seen?

What very important innovations in education were introduced in connection with the Saint Louis schools?

By whom were they introduced? What position did he afterward hold?

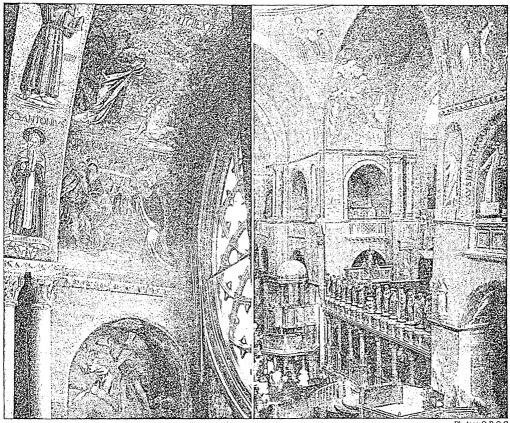
What accounted for the early commercial prosperity of the city? Why is this factor no longer of as great importance as it was formerly?

What is the popular name for the city, and why was it given?

To how many nations has this region

SAINT LOUIS RIVER. See SAINT LAW-RENCE RIVER.

SAINT LOUIS UNIVERSITY. See MIS-SOURI (Education).



INTERIOR VIEWS OF SAINT MARK'S

hotos: OROC

At left, a small section of the excellent mosaic work in the great building; it is estimated that the mosaics cover an area of more than an acre. At right, some of the statues and paintings.

SAINT LUCIA, *lu' shih ah*, one of the Windward Islands (which see).

SAINT MARK, CATHEDRAL OF, a church in Venice, named for Mark the Evangelist, the patron saint of the city. The first church on the site was built in the ninth century, when the supposed remains of the Evangelist were brought to Venice, but this structure was destroyed by fire, and in the tenth century, a second was built. Originally, this second church was a simple structure, in plan, like the modern one, a Greek cross. Largely rebuilt between 1047 and 1071, the cathedral was gradually altered and embellished until it became what it is to-day—one of the most gorgeously beautiful buildings in the world. In the days of the republic of Venice, there existed a law compelling every merchant who journeyed to the Orient to carry back something to adorn the sacred edifice; and the building as it stands is a veritable museum of

The church faces the Square of Saint Mark (see Venice). In form, as stated above, it is a cross, 250 feet from east to west, 220 feet in

greatest width; over the center there is a dome forty-two feet in diameter, and over each arm a smaller dome. In part, the style of architecture is Byzantine, and the little cupolas resemble the minarets of a mosque. Five porches, opening upon the Square of Saint Mark, lead to five doors, over the central one of which are set four colossal horses of bronze, which were brought from Constantinople in 1204. Near by is the famous campanile, which collapsed in 1902, but has been completely restored (see Campanile).

Within the church, the decoration consists chiefly of mosaics, set in a gilded background. The vaults of the ceilings are comparatively low, and these mosaics, with their exquisite color schemes, are easily seen. The chancel screen is crowned with marble statues of Mary, Saint Mark, and the Twelve Apostles, and various statues of marble or of bronze decorate other parts of the church. At certain seasons, there is displayed the wonderful altar screen, accounted one of the most beautiful pieces of gold and silver work in the world. It contains hundreds of precious stones.

Previous to 1807, Saint Mark's was merely the royal chapel, but since that date, it has been the cathedral of Venice.

SAINT MARTIN'S SUMMER. See Indian Summer.

SAINT MARY'S COLLEGE, a Roman Catholic school, located at Moraga, Calif.

SAINT MARY'S DOMINICAN COLLEGE.

See Louisiana (Education).

SAINT MARY'S RIVER, the stream, or strait, that carries the waters of Lake Superior into Lake Huron. It is about forty miles long, and forms a part of the boundary between Ontario and the Upper Michigan peninsula. A number of islands divide it into two main channels, each of which expands into several lakelike bays. Near the upper end of the river are the Saint Mary's Rapids, where there is a fall of nearly twenty feet within a mile. To avoid these rapids, canals have been constructed, on both the Canadian and American sides. Though sometimes called the Saint Mary's Canals, these are better known as the Sault Sainte Marie Canals (which see). The rapids furnish power for manufacturing, and are crossed by a railway bridge a mile long.

SAINT MARY'S RIVER. See FLORIDA (Waterways).

SAINT MARY'S SEMINARY AND UNI-VERSITY, Catholic institution, Baltimore, Md.

SAINT MAURICE, mo rees', RIVER. See SAINT LAWRENCE RIVER; QUEBEC (Rivers and Lakes).

SAINT MICHAEL, FEAST OF. See MICHAEL, SAINT.

SAINT MICHAEL'S COLLEGE, a Roman Catholic college for men in Winooski, Vt.

SAINT-MIHIEL, saN-me yel'. See WORLD WAR I (Americans in Battle).

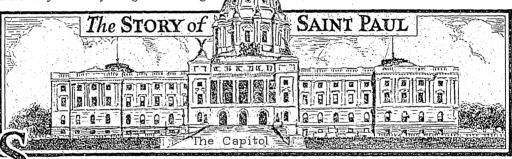
SAINT MORITZ, saint mo' rits. See SWITZERLAND (The Cities).

SAINT NICHOLAS. See NICHOLAS, SAINT. SAINT OLAF COLLEGE. See MINNESOTA (Education).

SAINT PATRICK AND SAINT PATRICK'S DAY. See Patrick, Saint.

SAINT PATRICK'S CATHEDRAL. See CATHEDRAL (American Cathedrals); NEW YORK CITY (Churches; illustration, page 4990).

SAINT PATRICK'S CROSS. See color plate, "The Sun Never Sets on the British Flag," in article Flag.

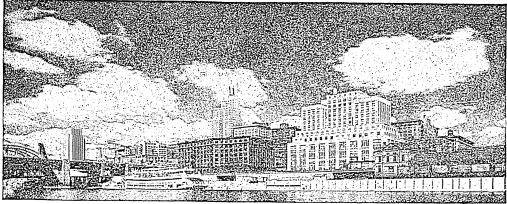


AINT PAUL, MINN., the capital of the state and the county seat of Ramsey County, is a leading wholesale, manufacturing, railroad, and livestock center. It is in the southeastern part of the state, 398 miles northwest of Chicago, 153 miles southwest of Duluth, and 1,784 miles east of Seattle. Adjoining the city in the west is Minneapolis, and the two are often referred to as the "Twin Cities." Population, 287,736 (1940).

General Description. The greater part of Saint Paul is on the north bank of the Mississippi River, which rises in three terraces from 100 to 200 feet high. The first of these is mainly occupied by railroad yards and river industrial sites; the second by the business section; and the third and highest, by residences. The picturesque river scenery has enabled the city to achieve excellent effects in the planning of parks and boulevards. Kellogg Boulevard is a scenic drive named for Frank B. Kellogg (which see). The boulevard extends for a mile along the downtown river

front, and with well-known Summit Avenue is a part of an extensive boulevard system. The parks, drives, and playgrounds comprise over 2,000 acres. In Como and Phalen parks are beautiful lakes; there are thirty lakes within thirty minutes of the city, the largest being White Bear. There are many fine golf courses.

Buildings. The magnificent State Capitol on a hill overlooking the city was designed by the architect Cass Gilbert, who started his career in Saint Paul. The exterior is adorned by sculptures executed by Daniel Chester French and Edward C. Potter. The story of the state's history has been told in mural paintings by many artists, among whom are John La Farge, Edwin H. Blashfield, Kenyon Cox, and Howard Pyle. The structure is built of white marble and native granite. The city hall and courthouse is an outstanding example of a combination of beauty and utility; 80 per cent of the space in the building is usable; thirty different kinds of veneered wood from all over the world were used to finish the offices and



SKYLINE OF SAINT PAUL

Photo: Kellet-Richle

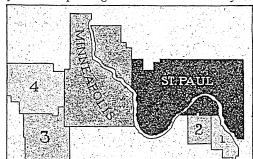
courtrooms. The concourse or main hall is a memorial to the soldiers and sailors of Ramsey County. It is eighty-five feet long, forty-one feet high, with walls of blue Belgian marble and gold-mirrored ceiling. A huge statue of an Indian in Mexican onyx, typifying peace, stands in one end of the concourse, the work of Carl Milles. All materials for the building were fabricated in Saint Paul. Other prominent buildings are the new Federal building, the public library, James J. Hill Reference Library, and the municipal auditorium, which has 110,000 feet of exhibition space and facilities for ice skating.

In 1928 the city passed a bond issue of \$16,000,000 to finance an extensive program of public buildings, schools, parks, and other improvements. New bridges were built and streets widened to accommodate increasing traffic. The Minnesota State Fair Grounds are located in Saint Paul.

Transportation. Saint Paul is served by the Chicago, Burlington & Quincy; the Chicago Great Western; the Chicago, Milwaukee, Saint Paul & Pacific; the Chicago, Rock Island & Pacific; the Great Northern; the Minneapolis & Saint Louis; the Minneapolis, Saint Paul & Sault Sainte Marie; the Northern Pacific; and the Chicago & North Western. In Saint Paul are the general offices of the Northern Pacific; Great Northern; and Chicago, Saint Paul, Minneapolis & Omaha railroads. The Mississippi River carries more than one-half million tons of freight annually to the Saint Paul Harbor To increase commerce, the city has provided a barge and coal terminal adjacent to a fine river harbor. The greatest inland marine barge terminal in the United States is located here, oil and gasoline being shipped up the river by barge. The airport is strategically located near the heart of the hotel and business district and is the headquarters of the Northwest Airlines. Four radio stations have studios in the city.

Commerce and Industry. Saint Paul's industries are diversified. It is an important

publishing center. The country's largest law book publishing concern, the largest manufacturer of calendars and advertising novelties, and one of the chief manufactures of sandpaper and surface-coated abrasives are located there. Other important products are refrigerators, fur goods, meat and food products, machinery, and metal products. The city is an important wholesale center. South Saint Paul's stockyards and packing houses are second only to

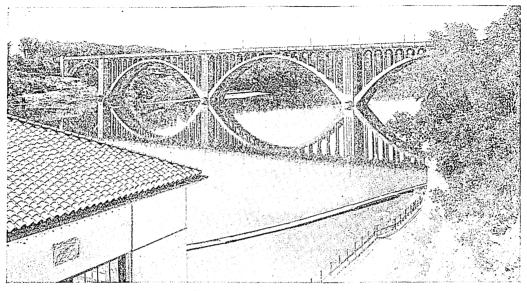


THE METROPOLITAN DISTRICT

- 1. South Saint Paul City 2. West Saint Paul City
- Edina Village
 Saint Louis Park Village
- Chicago in slaughter of livestock. Mushrooms are cultivated in caves along the river. An automobile company has a plant located on the river, adjacent to the government lock and dam from which power is obtained. Glass for automobiles is manufactured from silica sand which underlies the factory.

Education and Institutions. Higher educational advantages are offered by Concordia College (German-Lutheran), Hamline University (Methodist), Macalester College (Presbyterian), Saint Paul Seminary, Saint Paul Collegeof Law, Saint Thomas College (Catholic), and the state agricultural college, a part of the University of Minnesota, the main buildings of which are in Minneapolis. There are splendid systems of public and parochial schools.

Saint Paul has been the see of the Catholic



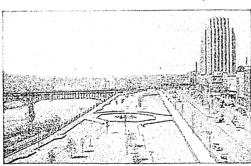
FORD BRIDGE AT SAINT PAUL

This bridge connects the principal residential sections of the "Twin Cities" and spans the Mississippi near the Ford High Dam at Saint Paul.

archbishop of the province of Minnesota since pioneer days.

The Wilder Charities, a foundation of over \$2,000,000 of invested funds, affords the basis of charitable work in the city.

History. Father Louis Hennepin visited the site of Saint Paul as early as 1680. Traders and trappers passed over the site at infrequent intervals, and Jonathan Carver came there from Connecticut in 1766. In 1805 Lieutenant Zebulon M. Pike was sent to explore the



KELLOGG BOULEVARD

Boulevard and wall along the Mississippi River in downtown Saint Paul. The new Courthouse and City Hall building at the right.

territory acquired under the Treaty of Paris, and at this place he made a treaty with the Sioux, obtaining from them a grant of the land where Fort Snelling was built ten years later. A scattering settlement was made about the fort, and in 1841 Father Lucien Galtier and Father A. Ravoux built a small log chapel on the corner of the present Third and Minnesota

streets, and dedicated it to Saint Paul. The place became known as Paul's Landing, and then as Saint Paul. During the eighteenforties, the city, because it was at the practical head of navigation, took the lead over other settlements, and began to develop its famous oxcart trade in furs and buffalo meat with the Red River Valley.

When Minnesota became a territory in 1849, Saint Paul was incorporated as a village and was made the territorial capital; it continued as the state capital when, in 1858, Minnesota was admitted to the Union. It had become a city in 1854. A new charter establishing a commission form of government went into effect on January 1, 1914. A zoning ordinance was adopted in 1924.

SAINT PAUL DE LOANDA, lo ahn' dah, or SÃO PAULO DE LOANDA, sou N pou' loo day lo ahn' dah. See ANGOLA.

SAINT PAUL ISLAND, one of the Pribilofs. See Pribilof Islands.

SAINT PAUL'S CATHEDRAL. See LONDON (England).

SAINT PETER, LAKE. See SAINT LAWRENCE RIVER.

SAINTS PETER AND PAUL, CATHEDRAL OF. See CATHEDRAL; WASHINGTON, D. C.

SAINT PETERSBURG, the "City of Peter," known as Petrograd from 1914 until 1924, when the name Leningrad was adopted in honor of Lenin. See LENINGRAD.

SAINT PETERSBURG, FLA., in Pinellas County, is one of the most popular of Southern United States winter resorts. It is known as "the Sunshine City," and is on the west-central

Gulf coast of Florida, nineteen miles directly southwest of Tampa, covering all the southern tip of the peninsula that separates Tampa Bay from the Gulf of Mexico. The city has a twenty-eight-mile beach, an excellent harbor, a million-dollar recreation pier (see illustration, page 2480), over a hundred hotels, hundreds of apartments, and several sanitariums. Gandy Bridge, seven miles long, shortens the land journey to Tampa by thirty-five miles; around the bay from Tampa to Saint Petersburg the distance is fifty-four miles.

The place was first settled in 1888, and named for Saint Petersburg, Russia, by Peter Devens, a Russian engineer, who built the first railroad into the town. It was incorporated as a village in 1892, and as a city in 1903. In 1913 the commission plan of government was adopted. During some winter seasons, there are 250,000 tourists in the city. Population, 60,812 (1940).

Railroads. The Atlantic Coast Line and the Tampa & Gulf Coast Railroad (Seaboard Air Line) serve the city. Other transportation facilities include the National Air Lines and the P. & O. Steamship Company

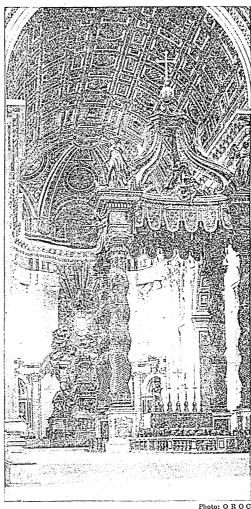
Industries. Its excellent harbor makes Saint Petersburg a Gulf port. Extensive fisheries constitute the chief industry. The city is also a market for truck and citrus fruits grown in the vicinity. There are over fifty home manufactures.

SAINT PETER'S CANAL. See Canada (Transportation).

SAINT PETER'S CHURCH, the largest and most imposing Christian church in the world, is situated in Rome, adjoining the Vatican (which see). This great edifice stands on the site of the Circus of Nero, where many Christians suffered martyrdom. The approach to it is through an open space, the Piazza di San Pietro. This Piazza, the work of Bernini, is elliptical in form, covers several acres, and is surrounded by colonnades, or covered driveways. In the center of the Piazza stands a red granite obelisk eighty feet in height, which was brought from Egypt in the days of Caligula, but was not erected here until the sixteenth century.

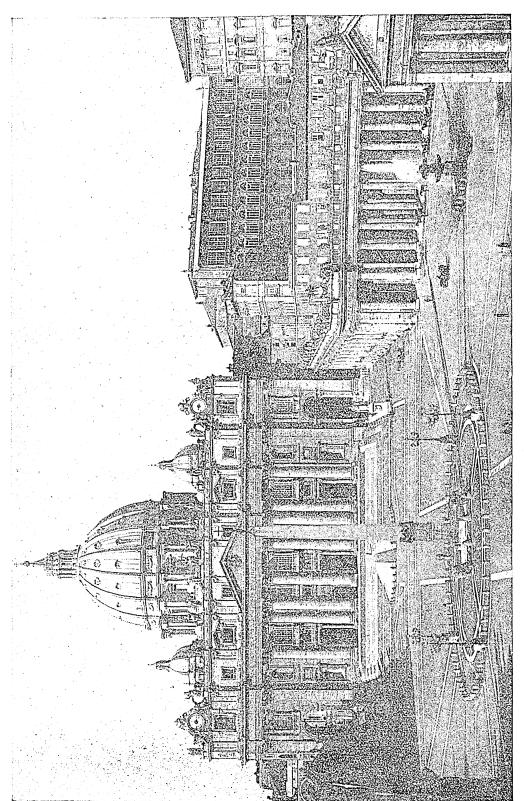
The building of Saint Peter's was a slow process. In A.D. 306, Constantine the Great built a basilica on the site and dedicated it to Saint Peter, and all through the Middle Ages, this was preserved. In the fourteenth century, however, it showed signs of decay, and plans were made for rebuilding. The crypt of Saint Peter's is the only part of the basilica remaining. The structure was begun in the sixteenth century, and then the plans were entirely changed. Bramante, the first architect employed, designed the building in the form of a Greek cross with a dome, and, although the architects who succeeded him made changes, Michelangelo, who took charge of the work in 1546, followed more nearly the original plan. During the eighteen years that the work was in his hands, great progress was made, and the smallest details of the great cupola were worked out, so that the architects who came after him had little difficulty in completing his designs.

One important change was made in the plans by an architect who took charge early in the



A VIEW IN SAINT PETER'S CHURCH An unusual photograph, showing some of the elaborate detail of the interior.

seventeenth century—a change for the worse. Of the original Greek cross, he made a Latin cross, with the long arm in front; because of this huge extension, the spectator does not get a proper view of the dome until he is half a mile away. In 1626 the building was dedicated by Pope Urban VIII, and the colonnades, massive Doric columns, were added by Pope Alexander VII, in 1667. The central bronze doors are relics of the old church. To their right is the Porta Santa, which is opened once in twenty-five years.



Stately Saint Peter's. This is the most notable church in the Roman Catholic world. In the foreground is the piazza, designed by Bernini; at the right are the build-6326



THE DEATH OF VIRGINIA

In Paul and Virginia, Saint-Pierre gave to the world one of the most absorbing romances in all literature.

Within, the proportions are such as to be almost startling. Including the portico, the church is 696 feet long, and its width, through the transepts, is 450 feet. The nave is 150 feet high, but the dome rises over 400 feet, and its diameter is 138 feet. One may ascend to the ball of the dome by a staircase. About the walls are altars, chapels, tombs, and in-numerable works of art; while beneath the center of the dome rises the high altar, at which only the Pope, or a specially authorized cardinal, may officiate; and above this towers the great bronze canopy, ninety-five feet in height. The total cost of the building is estimated at about \$50,000,000, and over \$30,000 is spent each year in caring for it and keeping it in repair. A group of small houses, on the roof, forms a village for the accommodation of custodians and workmen. In ecclesiastical position, Saint Peter's ranks below the Lateran (which see).

SAINT-PIERRE, saN-pyair', JACQUES HENRI BERNARDIN DE (1737-1814), a naturewriter and novelist born in Havre, France, famous as the author of Paul and Virginia. He was educated for the profession of civil engineer, but found no interest in life apart from the

study of nature.

His first book, A Voyage to the Isle of France, which appeared in 1773, in Paris, was simply and charmingly written. Rousseau, who believed but little in religion, admired the work for its naturalness, and the powerful bishop of Aix, who was certainly the opposite of Rousseau, admired it for its reverence. The bishop procured Saint-Pierre a yearly pension (the equivalent of \$200) from the French government, and with this income, the author set about the pleasant task of writing his Studies of Nature. In 1789 he wrote, as a supplement to this work, his famous Paul and Virginia, recognized as one of the great masterpieces of descriptive fiction. The plot, dealing with the childhood of a boy and a girl in an ideal woodland, is very light, but the sentiment, the vivid descriptions, and the tone of innocence and purity make the story one of the most touching in all literature. The book had much influence in shaping French fiction in simple and natural style, and has been translated into the language of every civilized nation.

SAINT PIERRE AND MIQUELON, saN pyair', me k' lawN', groups of small islands representing the only remaining French possessions in North America, and located about ten miles southwest of Newfoundland. The Miquelon group, consisting of Grand Miquelon and Little Miquelon (joined by a belt of sand), is eighty-three square miles in area, and has a population of about 500. Though small, Saint Pierre, with ten square miles, has a population of 3,500. The islands are barren and rocky, and though unsuited for agriculture, they are important as the center of the French Atlantic fisheries. Every year, during the six months' fishing season, which opens in May, the resident population is increased many times by the fishermen from the French coast towns. Cod is the principal catch, and tons of fish, both dried and fresh, are exported annually. France regards these fisheries as excellent training for sailors for the navy, and provides generous bounties.

The chief town, Saint Pierre, has direct steam communication with North Sydney and Halifax (Nova Scotia) and Saint John's (Newfoundland), and is on the line of the Anglo-American Cable Company. The town has a good harbor, and offers adequate shelter for ocean steamers. The low rates of duty enjoyed by the colony cause many articles to be imported, principally French wines and

liquors; these are later smuggled into Newfoundland, the United States, and Canada. Other imports are textiles, salt, foodstuffs, and meat.

Primary instruction is free, and excellent educational facilities are available. The colony is administered by a governor, aided by a council of administration and municipal councils.

France originally occupied the islands in 1660. They were held alternately by England and France until 1814, when France obtained undisputed possession of them as a fishing station. On Christmas Eve in 1942, the Fighting French took over the islands from Vichy (France) rule for World War II duration.

SAINT QUENTIN. See WORLD WAR I

(Events on Land in 1918).

SAINT-SAËNS, saN-sahNs', [CHARLES] CAMILLE (1835-1921), one of the great composers of his time, was born in Paris, France.

He began the study of music almost as early as his first lessons in reading and writing, and at the age of seven, was taking advanced piano instruction. Five years later, he was allowed to enter the Conservatory of Paris, and, before he was sixteen years old, had won both the first and the second prize in organ-playing. His first symphony was written at the age of sixteen; indeed, he was



Photo: Brown Bros SAINT-SAËNS

scarcely eighteen when he received the important position of organist in the Church of Saint-Merri, Paris. In 1861 he accepted one of the most responsible musical offices in all Europe, that of organist in the Madeleine Church of Paris, and held that post until 1877.

In 1863 the Society of Saint Cecilia of Bordeaux awarded first honors to his overture Spartacus, and in 1867 the authorities of the International Exhibition at Paris awarded him the prize for his cantata Noces. These honors, together with deserved fame as a pianist, came to him before his thirty-second birthday, but it was not until 1872 that Saint-Saëns had an opera accepted. Even then, this first effort, The Princess, was not successful, and others that followed it met with little favor. In 1877, however, his Biblical opera, Samson and Delilah, was produced at Weimar, and its popularity has steadily increased from that first Among musicians, Saint-Saëns appearance. will always be better known for his beautiful symphonic poems, such as La danse macabre and *Phaéton*, and for his short, graceful compositions for the piano. For the story of Samson and Delilah, see OPERA (Some of the Famous Operas).

SAINT-SIMON, saN se mawN', CLAUDE HENRI DE ROUVROY, Comte de (1760-1825), founder of French socialism, born in Paris and educated under the direction of D'Alembert. He took part in the Revolutionary War in America, distinguishing himself in the campaign against Cornwallis. His early writings were scientific and philosophical, although speculative. His thirst for knowledge was an avid one. Doubtless, his service in the American cause whetted his appetite for industrial as well as political freedom. During the French Revolution, Saint-Simon approved of the abolition of titles, and, though he took no active part in any of the movements, was imprisoned for a time. His ambition from youth up was to do something to benefit mankind, and after the Revolution, with the aid of the fortune which he had amassed by buying and selling the estates of the émigrés (which see), he set about experimenting as to the exact form his uplift movement should take. Later, losing all his money, he was supported by a pension allowed him by his family.

Saint-Simon stood for the necessity of a complete reorganization of society, with industry as its basis, and science as its guiding principle. Every one, in his ideal state, should be obliged to work, and each should receive rewards commensurate with his labor. The law of inheritance was to be abolished. The disciples of Saint-Simon elaborated his rather vague and confused teachings into the socialistic

system known as Saint-Simonianism.

SAINT SOPHIA, so fe' ah, the largest Mohammedan mosque (now a museum) in the world, located in Istanbul. See Santa Sophia.

SAINT THOMAS, one of the Virgin Islands of the United States (which see).

SAINT THOMAS COLLEGE. See MINNE-

SOTA (Education). SAINT VINCENT, a mountainous island in the British West Indies, a part of the Wind-

ward Islands (which see). Saint Vincent has an area of 150 square miles, half of which is still covered with forests. The valleys are fertile, although eruptions of the volcano Soufrière have twice devastated considerable portions of the island. Until 1706 it was the stronghold of the warlike West Indian Caribs,

most of whom were deported.

The climate is healthful, with an abundant tropical rainfall. The chief products are arrowroot, cocoa, cotton, fruits, and spices. The quality of the sea-island cotton is said to be the best in the world. The capital, Kingstown, is a picturesque town with a population of about 3,900; the total population of the island is 53,228 (1930), mostly Negroes, descendants of freed slaves.

SAINT VITUS'S DANCE, OR CHOREA, ko re' ah, a nervous disease that most commonly attacks children between the ages of five and fifteen, especially girls. It is characterized by muscular jerkings of the face, neck, arms, hands, and various other parts of the body, and may be brought on by overstudy, worry, lack of outdoor exercise, late hours, fright, and shock. The disorder is closely related to rheumatism, and rheumatic heart disease is very prone to accompany it or follow it.

The exciting agent is a germ that affects the brain and spinal cord, and the disorder is frequently associated with diseased tonsils. While Saint Vitus's dance in its ordinary form is seldom fatal, an attack may last from six weeks to six months, and the disease tends to recur if proper precautions are not taken. Rest, nutritious food, relief from worry or mental exertion, and cold baths are among the hygienic measures used in combating the disorder. Physicians also prescribe tonics. Any child afflicted with Saint Vitus's dance should be taken out of school.

The importance of Saint Vitus's dance arises partly out of its relation to heart disease. Children should be protected against it as a measure of protection for their hearts. Their tonsils and teeth must be put in order, and foci of infection must be removed. They must get plenty of milk, for its lime; and an abundance of eggs, meat, and vegetables, for their iron. Children must not be allowed to become anaemic. They must be kept from becoming unduly fatigued, must not overwork or overplay, and must get enough sleep. Children with Saint Vitus's dance should be carefully watched as to the condition of the heart. See Education (Hygiene of Education). W.A.E.

Origin of Names. The term chorea is derived from a Greek word meaning dance; the other and more common name has come into use through associating the disease with a form of hysteria which prevailed in Central Europe in the sixteenth century, cures for which were sought at the shrines of Saint Vitus.

SAKE, sah' keh. See RICE (Other Uses); JAPAN (Mode of Life).

SAKHALIN, sah Kah leen', incorrectly spelled SAGHALIN, an extremely long, narrow island (600 miles long and 16 to 100 miles wide) off the southeastern coast of Siberia. It is divided in ownership between Russia and Japan (see Russo-Japanese War). The part north of 50° is Russian; the southern, Japanese, portion is known specifically as Karafuto.

The island is divided from the Asiatic land mass by the Strait of Tartary, about five miles wide; and the Strait of La Pérouse separates it from Yezo, the most northerly island of Japan. The island covers an area of 27,823 square miles; Japan's holdings, below 50°, cover about 13,935 square miles, and have a population of 331,943 (1935). The highest point is 4,860

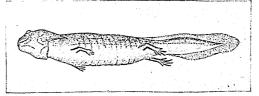
feet. The rivers are navigable only for short distances. In the Russian territory, important discoveries of oil led to rivalries of a serious political nature, because Japanese subjects found the oil and refused for a time to abandon the field at the command of Russia.

The climate is not well suited to agriculture; there is very little land under cultivation, for the terrain is mountainous. The fisheries provide the chief occupation and the staple food of the inhabitants. In the Japanese section, the astute government encourages settlement by supplying seeds and domestic animals, and natural resources—lumber and coal—are being intelligently exploited. Fur-bearing animals are numerous and valuable.

are numerous and valuable.

SALADIN, sal' ah din (1138-1193), a powerful sultan of Egypt and Syria, who rose from a soldier of the shepherd tribe of the Kurds to be vizier to the caliph. On the caliph's death, he usurped the throne, and greatly widened his borders by wars. His capture of Jerusalem, in 1187, caused consternation throughout the Christian world, giving rise to the Third Crusade (see Crusades). Saladin was compelled to surrender the stronghold of Acre to the crusading armies, in 1191. For two years they contended with him for the tomb of Jesus, but without further success than the securing of a truce of three years; during this truce, pilgrims were to be allowed to enter Jerusalem. The armies then withdrew. The next year, Saladin died, and his empire rapidly weakened under the rule of his jealous and intriguing successors. The chivalry of Saladin is pictured by Scott in The Talisman.

SALAMANDER. Salamanders are small animals with lizard-like bodies, four sprawling legs, and long tails. They belong to the same



A SALAMANDER

class as the frog, toad, and newt, being closely related to the latter (see Newt; Amphibians). In a scientific sense, salamander is the name of a genus of amphibians found only in the Old World, but the term is applied loosely in America to several salamander-like animals. Newts, too, are sometimes placed in this group. Salamanders are timid, inactive creatures, and usually harmless.

The spotted salamander of Europe, Asia, and Africa is one of the best-known species. It is from six to eight inches long, and has conspicuous black and yellow markings on its smooth, shiny skin. When roughly handled,



CELEBRATING THE VICTORY AT SALAMIS

its pores exude a milky, poisonous secretion which is a protection against its enemies. The eggs, which are laid in ponds or springs, hatch into creatures that breathe by external gills, and which, though they have four limbs, live a fishlike existence during the larval period. When full grown, the salamander becomes a land animal, frequents damp places, and feeds on snails, slugs, worms, and insects. Other species have various interesting habits. The giant salamander of China and Japan lives entirely in the water and has both lungs and gills in the adult stage. The mud puppy (which see) is a so-called American salamander.

Scientific Name. Salamanders belong to the family Salamandridae. The spotted salamander is Salamandra maculosa.

SALAMBRIA RIVER. See Thessaly. SALAMIS, an island of horseshoe shape, belonging to Greece, of slight commercial importance, but with interesting historical associations. It is situated in the Gulf of Aegina (anciently, the Saronic Gulf), off the coast of Attica, and due west of Athens. Barren, rocky, and mountainous, with an area of thirtysix square miles, the island supports a population of about 6,600, chiefly Albanians. Grain, olives, and grapes are raised in the valleys and coast regions. The modern name of the island, Kuluri, means baker's crescent. At Ambelaki, a city on the northeastern coast of the island near the site of the ancient capital, there is a naval arsenal.

In Homer's writings, Salamis belonged to Telamon and his sons Ajax and Teucer. The narrow strait between the northeastern corner of the island and the coast of Attica was the scene of the decisive naval Battle of Salamis, fought, in 480 B.C., between the Greeks and Persians, a few days after the Battle of Ther-



LOCATION MAP

Salamis and its geographical relation to Athens.

mopylae. Though they were superior in numbers and in size of vessels, the Persians were completely routed, losing 200 ships.

Related Subjects. The reader is referred in these volumes to the following articles:

Themistocles Xerxes (I, Persia)

SAL AMMONIAC, sal a mo' nih ak, a compound of chlorine and ammonia, the chemical name being ammonium chloride. It is prepared, in large quantities, by distilling the liquor of gas works, which contains a large proportion of ammonia. In its crude form, sal ammoniac is a dirty-white solid, but when purified, it forms fibrous white crystals. Crude sal ammoniac is employed extensively in the manufacture of electric batteries of the Leclanché

type [see Electric Battery (Open-Circuit Cells)], for cleaning surfaces to be soldered, in the manufacture of galvanized iron, in goldrefining, and in the textile industries. In a pure state, it is used as a remedy for bronchitis, pneumonia, and some stomach disorders. It dissolves readily in water, to which it imparts a salty taste. See Ammonia.

Chemical Formula. The formula for sal ammoniac is NH4Cl; that is, a molecule contains one atom of nitrogen, four atoms of hydrogen, and one atom of

SALARY, sal' a rih, GRAB, in United States history, the popular name of an act passed by Congress in 1873, which provided that certain increases in salary previously granted Senators and Representatives were to date from 1871. General indignation caused the repeal of the act, and the next year the salaries of the Congressmen were reduced to the original figures. When Congress raised the salaries of its own members, it increased also the President's salary from \$25,000 a year to \$50,000; that of the Chief Justice from \$8,500 to \$10,500; and those of the Vice-President, Associate Justices, and Speaker of the House from \$8,000 to \$10,000. By the final act, all were reduced to the original figures except salaries of the President and members of the Supreme Court. (See articles on the officials named, for their present salaries.)
SALE, BILL OF. See BILL OF SALE.

SALEM, Mass., one of the two county seats of Essex County, situated in the northeastern part of the state, seventeen miles northeast of Boston. Population, 41,213 (Federal census of 1940).

On a narrow arm of land curving around a capacious harbor, Salem has stood for over 300 years. Sailing vessels back from Europe, and from Africa, India, and China, have cast anchor in the harbor, and tanned sea captains have returned to it with the jades and vases which today add glamour and color to many New England homes. One of the most famous of the city's old houses is the birthplace of Nathaniel Hawthorne (which see) and the House of Seven Gables upon which he based his famous novel. The Witch House, built in 1674, and scene of the infamous trials of 1692, is a cheerful white building shadowed by elms. An exhibit brought from Sumatra, in 1779, opened the Peabody Museum of Science, which has since received collections from the East Indies, Japan, and other countries. An historic New England collection is housed in Essex Institute, and a valuable library in the Athenaeum. Overlooking the harbor is Gallows Hill—in spite of its sinister name, a beautiful park. The Pioneer Village, at Forest River Park, is a reproduction of Salem in 1830.

After 1860, the sea trade declined, and twenty years later, the shipyards ceased opera-

tion, but Salem is still a manufacturing city with about 150 industries. Shoes, cotton cloth, hides, leather, lumber products, incandescent lamps, radio tubes, and steam specialties are the chief products. Both railroad and bus service

connects Salem with Boston.

History. In 1626, Roger Conant and a group of twenty-seven established a settlement at Naumkeag, which three years later became Salem. Streets and lots were laid out in 1628 by John Endicott. The stern Puritans looked with great disfavor upon Roger Williams (which see). After he left the settlement, the villagers began persecuting the Quakers, and in an hysterical frenzy, which came to a climax in 1692, hanged nineteen persons accused of witchcraft. During one summer persecutions continued, but in the revulsion of feeling that followed, all the victims were released. A peaceful period followed until 1775, when the citizens successfully resisted a British force at the North River Bridge. In 1835 Salem was incorporated.

SALEM, Ohio. See Ohio (back of map).

SALEM, ORE., capital of the state and county seat of Marion County. It was founded in 1812, incorporated as a city in 1860, and became the state capital in 1864. Located fifty miles south of Portland in the fertile Willamette River valley, it is the canning center of the Northwest, with an annual output of over 250,-000,000 cases of fruit, berries, and vegetables. Other industries include a paper mill, a paper converting plant, a meat packing plant, a woolen mill, and an iron works. Salem also has two linen mills, and is the center of the only long-fiber flax section in the United States.

Among the city's educational institutions are Willamette University, and the state schools for the deaf and the blind. The capitol was burned in 1935 and a new building was completed in 1938. Population, 30,908 (1940).

SALEM COLLEGE. See WEST VIRGINIA (Education).

SALEM WITCHCRAFT. See WITCHCRAFT; SALEM, MASS; COLONIAL LIFE IN AMERICA.

SALEP, the dried tubers of certain species of orchids, which are used medicinally for lubricating purposes. See Orchid.

SALERATUS, sal e ra' tus. See Soda.

SALES TAX. This tax takes many forms. It is usually a tax merely on sales of goods, but it may be on sales of all kinds, including real estate, securities, or services. The tax may be levied on a relatively few articles (selective sales tax) or on a wide range of articles (general sales tax). It may be levied on sales by producers, wholesalers, or retailers. The rate of taxation is usually moderate, around 2 per cent. The gasoline rate is very high, often 20 per cent or more.

The widespread use of general sales taxes is a recent development. Almost non-existent in 1914, they are now employed in nearly all the leading industrial countries of the world and in many of the American states. The introduction and continued use of these taxes is one of the outstanding fiscal changes of

the post-war period.

The main objection to the sales tax is that it is a tax on consumption, which falls with especial weight on the poorer classes. The widespread resort to the tax, despite this defect, is due to the marked decline in yield of other taxes, such as income and general property taxes. The sales tax, though levied at a moderate rate, produces enormous revenues, even in years of depression. Hence its present vogue. See Tax and Taxes. E.J.

SALFORD, ENGLAND. See ENGLAND (The

Cities).

SALIANS, sa' lih anz, a division of the ancient Franks (which see). See, also, SALIC LAW.

SALICIN, sal' ih sin. See MEDICINE AND DRUGS (Medicines Usually Do Not Cure).

SALIC, sal' ik, LAW, an early compilation of the barbarian laws of the Salian, or Merovingian, Franks, which dealt mainly with torts, crimes, and procedure. The date of this code is uncertain, but there is evidence that it was compiled in the reign of Clovis (466-511). Essentially, it is a penal code prescribing fines for various offenses, and specifying civil-law regulations. The most famous clause, and the one which, alone, is often designated as "the Salic Law," refers to the inheritance of private property; it states that, of Salic land, "no portion of the inheritance shall come to a woman."

When the code was first drawn up, there was in it no reference to inheritance of the throne, and probably at that time, no such interpretation was intended. Later, however, the law was invoked to keep women from succeeding to the crown. Its first application in this connection seems to have occurred in France during the struggle between Philip VI and Edward III of England (1312-1377). The English king claimed the right to the crown in descent from his mother Isabella, daughter of Philip IV (the Fair), king of France. His claim was repudiated as coming from a woman, and as violating the Salic Law.

In 1714 Philip V introduced this law into Spain, but it was revoked by Philip VII in 1830. The question as to whether, while being barred from succession, a woman might transmit her rights to her descendants was a vexed question. Besides embroiling France and England in the fourteenth century, it was the cause of the War of the Austrian Succession in the eighteenth century (see Succession Wars). It was this law, too, that prevented Queen Victoria from succeeding to the throne of Hanover at the death of William IV.

SALICYLIC, sal ih sil' ik, ACID, a compound of carbon, hydrogen, and oxygen, occurring in combination in the oils of wintergreen and birch, and in some chemical substances. It has many uses, and is manufactured for commercial purposes from oil of wintergreen, or from carbolic acid. When pure, it occurs in fine, white, needle-like crystals. It has a sweetish acid taste, is sparingly soluble in cold water, but dissolves readily in hot water.

Salicylic acid is extensively used in medicine. It is an ingredient of aspirin, salol (which see), and artificial oil of wintergreen; with zinc oxide, starch, and petrolatum, it forms a paste used to cure ringworm and eczema; it is found in cures for corns and warts, and is taken internally for sore throat and rheumatic ailments. It is also effective as a remedy for excessive sweating. Salicylic acid is a powerful antiseptic, but, because it has been used to conceal the poor qualities of bad food, its use as a food preservative has been forbidden by the United States government. See Pure-Food Laws.

The acid is employed in the arts for strengthening glue, preserving hides, and, in combination with other substances, in the manufacture of yellow, orange, and purple dyes. T.B.J.

Chemical Formula. The formula for salicylic acid is $C_0H_4(OH)COOH$; that is, a molecule consists of six atoms of carbon, four of hydrogen, and the two radicals, OH and COOH, associated atoms of oxygen and hydrogen, and of carbon, oxygen, and hydrogen, which remain together in chemical reactions.

SALINA, sah li' nah, KAN. See KANSAS (back of map).

SALINAS RIVER, a sandy river flowing partly underground in west-central California (see colored map).

SALINOMETER, sal ih nom' e tur. See Hydrometer.

SALISBURY, sawlz' behr ie, located in Mashonaland, is the capital of Southern Rhodesia. See Mashonaland; Rhodesia.

SALISBURY, ROBERT ARTHUR TALBOT GASCOYNE-CECIL, Marquis of (1830-1903), a distinguished English statesman, born at Hatfield in Hertfordshire and educated at Christ Church, Oxford. After his graduation, he traveled for a time, and in 1853, as Lord Robert Cecil, was elected to Parliament from Stamford. Before 1860 it came to be recognized that he was a decided addition to the ranks of the Conservatives, and as early as 1865, he began to be looked upon as one of the foremost politicians of England. In the latter year, he became Lord Cranborne, by the death of his brother. A year later, he entered the Cabinet as Secretary of State for India, but the Cabinet split in 1867 over a reform bill, and Cranborne resigned. In 1868, on the death of his father, he became third Marquis of Salisbury, and took his place in the House of Lords.

Between 1869 and 1873, Salisbury was leader

of the Opposition, but in 1874 he took office as Secretary of State for India in the newly organized Cabinet of Disraeli. In 1878 he became Secretary of State for Foreign Affairs, and it was largely his influence which brought about the Congress of Berlin, which he at-

tended with his chief, Disraeli. The Conservatives went out of office in 1880, and in 1881, on the death of Beaconsfield, Salisbury became leader of the Conservative party. Not until 1885 was he again in office, but this time it was as Premier. Before anything had been accomplished, the Conservatives were defeated in a general election, and Glad-



LORD SALISBURY

stone became Prime Minister, but Salisbury was returned to office in 1886. Save for the years between 1892 and 1895, he remained at the head of the government until 1902.

Although Salisbury had little sympathy with the masses of the people, official confidence in him steadily increased, and was justified by his unwavering, if cautious, patriotism, and by the outstanding position which he acquired among the diplomats of Europe. His great interest lay in foreign affairs, and his policy was one of peace. In 1895 a break with the United States on the Venezuelan question threatened, but Salisbury managed to maintain peace in the face of difficulties. One of the chief events of his administration was the agreement with Germany, in 1890, by which the British and German spheres of influence in Africa were marked out.

SALISBURY CATHEDRAL. This cathedral has the highest church spire in England. See England, page 2244.

SALITE, sa' lite, a dark-green variety of the

mineral pyroxene. See Pyroxene.

SALIVA, sa li' vah, a watery, mucoid, alkaline fluid secreted by three pairs of glands in the mouth and cheeks, known as the salivary glands. These are the parotid, in front of the ear; the submaxillary, under the lower jaw; and the sublingual, below the tongue. Other small glands in the mucous membrane of the mouth contribute to the saliva. Saliva contains a ferment known as ptyalin, which begins the digestion of starch and other carbohydrates, in the mouth. Saliva serves also to keep the mouth moist, a very important factor in our physical comfort. There is scarcely anyone who has not experienced the discomfort of a dry mouth, brought on by "stage fright" or shock of some sort; this is because the secretion

of the fluid is temporarily stopped by nervous, ness. *Ptyalism*, or excess secretion of saliva, is a symptom of mercurial poisoning.

Formerly, in the East Indies, persons accused of crime were compelled to swallow parched rice to prove their innocence. If guilty, it was argued, the accused would believe that he could not swallow the rice, and his fear would tend to check the action of the salivary glands, actually preventing his swallowing the grain. The falsely accused, on the contrary, would be conscious of his innocence, and his glands would work normally.

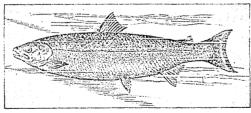
K.A.E.

Related Subjects. For details of the work of saliva in digestion, see Mastication; Digestion (The Mouth). See, also, Stomach; Glands.

SALIVARY, sal' ih va rie, GLANDS. See SALIVA.

SALLUST, sal' ust (86-34 B.C.), a Roman historian of plebeian origin. He served as quaestor about 59 B.C., and in 52 as tribune of the people. When the Civil War broke out, he took the side of Caesar, whom he accompanied on his African campaign, in the year 46 B.C. At its close, Sallust was appointed proconsul of Numidia, and while in this office, he made himself very unpopular by his extortions. Returning to Rome with a great fortune gathered by these oppressions, he withdrew from public life and devoted his time to writing. Of his Historiarum Libri Quinque, there remain only fragments, but his accounts of the conspiracy of Catiline and the war against Jugurtha are extant, and form the first Roman examples of what, in modern times, is called history. See JUGURTHA.

SALMON, sam' un, the common name of a family of valuable food fish, including white-fish, trout, and various species generally spoken



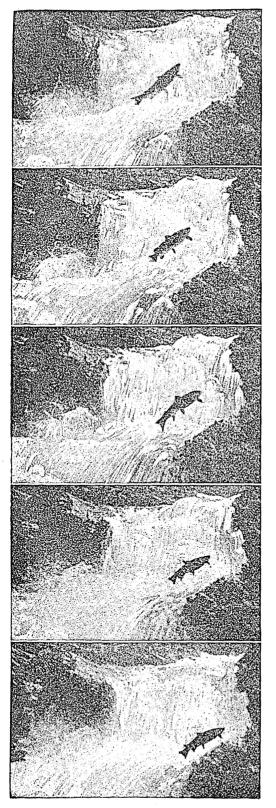
THE SALMON

A minor poet named Drayton thus describes the extraordinary ascent of waterfalls by this fish:

Here when the labouring fish does at the foot arrive, And finds that by his strength but vainly he doth strive.

His tail takes in his teeth, and bending like a bow That's to the compass drawn, aloft himself doth throw:

Then springing at his height, as doth a little wand, That, bended end to end, and flirted from the hand, Far off itself doth cast, so does the salmon vault. And if at first he fail, his second somersault He instantly essays: and from his nimble ring, Still yarking never leaves, until himself he fling Above the streamful top of the surrounded heap.



of as salmon. The fish usually thought of when the word salmon is mentioned are the species inhabiting the coast waters of the North American Pacific, which ascend freshwater streams at spawning time, and are then captured in vast numbers for the canning trade. An Atlantic salmon, some varieties of which are landlocked in the lakes of Maine and Eastern Canada, is placed by scientists in the same genus as true trout (Salmo). It differs in both structure and habits from the Pacific salmon, and though found in abundance in colonial times, has disappeared as an important food fish on the Atlantic coast.

The Pacific Salmon. Five species, all of commercial value, are found in the Pacific. These belong to the genus Oncorhynchus. Their highly specialized reproductive habits have excited the interest of naturalists for years. Hatched in fresh-water streams. the young remain there for nearly two years, and then make their way to the sea, where the next two or three years are spent. Of their life in the sea, little is known, but it is believed that they rarely travel more than 100 miles from the mouth of the river in which their lives began. Some go out less than ten miles. When the fish are about four years old, they return to the rivers to spawn, some species starting in the spring, and others in the fall. The presence of cold currents in the ocean starts the salmon on their periodical runs, and springrunners seek rivers fed by melting snow.

The journey upstream is a most extraordinary one. The strong, gamy fish fight their way back with a persistence that fears no obstacles. They advance against swift rapids, ascend small cataracts with ease, and sometimes leap almost perpendicularly upward over falls a dozen feet high. If unable to make the leap, they persevere until they die from exhaustion or injuries. No food is taken during the run, though some of the salmon in the Yukon River travel 2,000 miles to their spawning grounds. The spawning period extends from March to November or December, varying in different localities. The female pours forth countless numbers of eggs into a nest from one to four feet deep, which the male has hollowed out in the gravelly bed of the stream. After spawning, the parent pair float downstream, tails foremost. They make no effort to swim, nor to reach the sea. Within a few days-ten days, at the most-both males and females die. The young hatch in 120 to 180

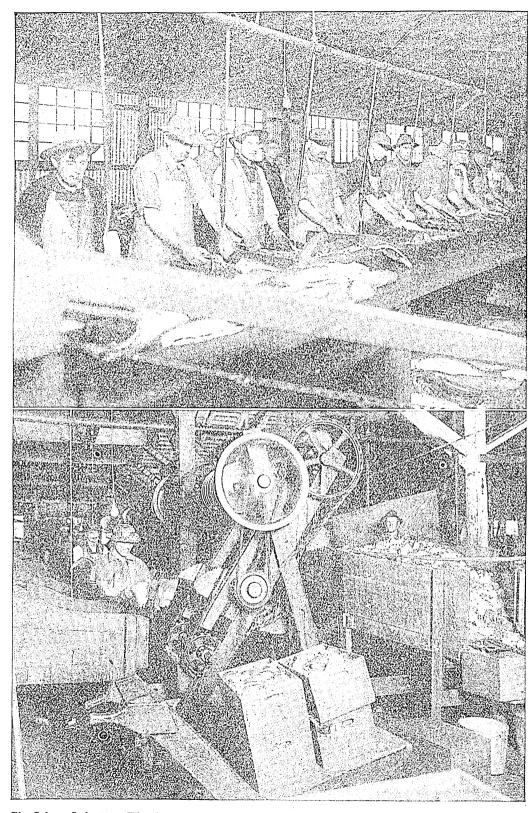
(Continued on page 6339.)

SALMON LEAPING UP A CATARACT

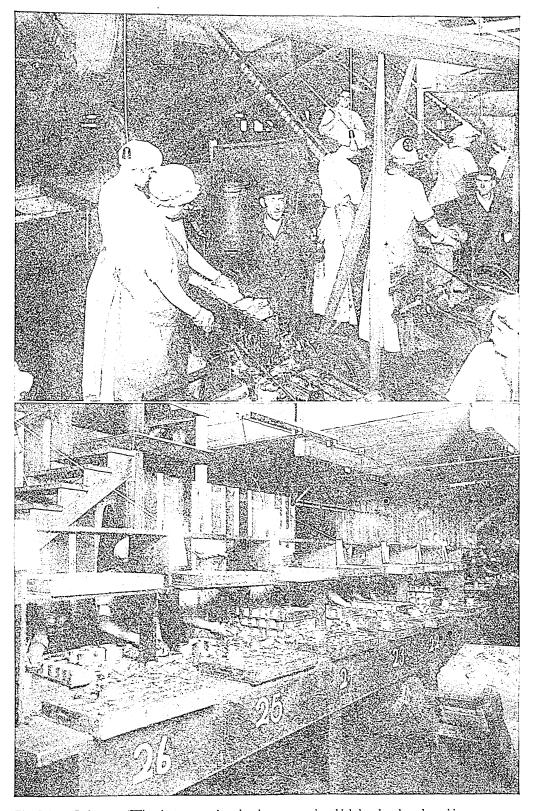
Natural obstacles mean little to Pacific salmon, unless these are too formidable. When salmon start for their spawning grounds at the sources of streams at higher elevations, they make their way, leap by leap, up cascades whose height would appear to be an insurmountable bar to their progress.



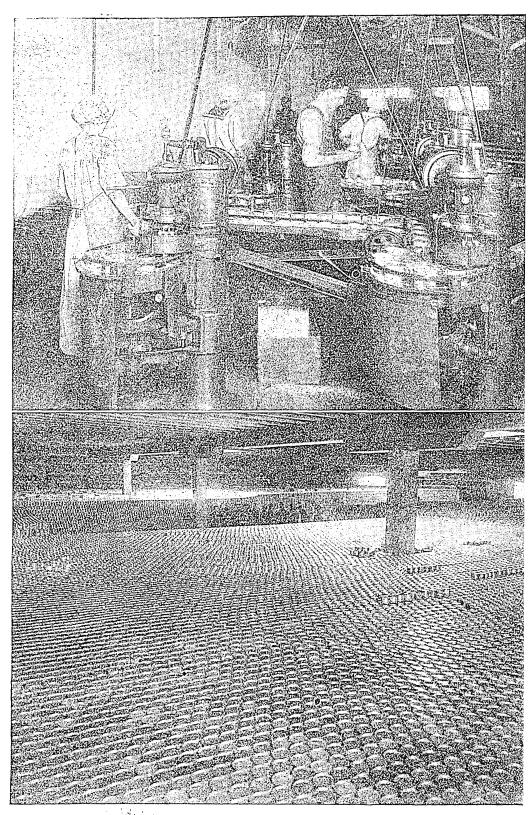
The Salmon Industry. (I). It is a heavy task to haul in a net full of salmon vigorously fighting for an avenue of escape. Below, a receiving room at a canning factory.



The Salmon Industry. (II). At top, workmen are engaged in the first of several cleaning processes. Below, machinery is employed to cut the fish into sections.



The Salmon Industry. (III). At top, another cleaning process, in which handwork and machinery are combined; the machines cut the meat into smaller bits. Below, the process of canning, performed almost entirely by machinery.



The Salmon Industry. (IV). After the cans have been filled, they pass by conveyors to the sealing machines 6338 shown in the first illustration. Below, a few million cans ready for boxing.

days, and are nourished for several weeks by a yolk sac suspended beneath the body.

The spawning process causes a remarkable deterioration in these fish. In the spring, all kinds of salmon are silvery, some species being spotted. As the spawning period draws near, the color changes to various darker shades, the skin grows slimy, and the males develop distortions of one kind or another. The flesh is worthless for food after the spawning, and is at its best at the start of the spring runs. In most cases, the approach of the spawning period causes it to turn pale and dry out.

The Pacific-coast species are distinguished as follows:

King Salmon, also called *chinook*, *quinnot*, and *spring salmon*. This is a spring-run species whose reddish, oily flesh forms the prized Columbia River salmon of the canning trade. It ranges from Monterey Bar, Calif., to Bering Straits, and has an average weight of twenty to twenty-five pounds, though roopound specimens are sometimes caught.

Red Salmon, also called sockeye and blueback. The flesh of this spring-run species about equals that of king salmon in palatability and market value. It is deep red, of fine texture, and oily. The average weight of the fish is five to eight pounds. In the spring, this species is bright blue above, silvery below, but the breeding fish is blood red, and the male develops a hook on the nose. Red salmon are the most valuable of Alaskan fish, the annual catch amounting to about 234,203,000 pounds.

Coho, also called *silversides* and *silver salmon*. This is a fall-run species, ranking next to the king and red salmon in commercial value. The flesh is of good flavor, but pink. The coho is about the size of the red salmon. It ranges from San Francisco northward, but is especially plentiful in Puget Sound.

Humpback Salmon, also called *pink salmon*. This fall-run species is the smallest of the group, its weight being three to six pounds. It is abundant in Alaska waters; the annual catch is 235,937,000 pounds.

Chum Salmon, also called keta, dog, and calico salmon. The chum salmon is a fall-run species ranging from the Sacramento River to Bering Strait. It is the lowest in food value of the Pacific species, as its flesh is mushy and somewhat dry. This salmon has an average weight of ten or twelve pounds.

The Salmon Industry. Salmon are easily captured in nets, traps, and paddle wheels, at the time of their runs, when they appear in vast numbers in the rivers. The orangered flesh of the spring species is in great demand; red salmon has about twice the market value of humpback and king, and a fifth greater value that coho and chum. Since these latter are caught at a time nearer the spawning season, their flesh is less desirable and commands a lower price. Salmon are marketed fresh, dried, smoked, frozen, and in other ways, but the greater part of the catch is put up in cans. The reports of the United States Bureau of Fisheries show that, while the production of fall-run salmon is below that of king and red salmon in value, it is much greater in quantity. The highly valuable fisheries have been exploited excessively, and the supply has been greatly diminished. A law passed by Congress in 1924 provides for the regulation of the salmon fisheries, and will protect them from future unwise exploitation. It is obvious that the amount of the catch must be limited, to prevent the extinction of the supply, inasmuch as the fish are captured before spawning. L.H.

Scientific Names. The Pacific coast salmon are known as follows: king, Oncorhynchus tschawytcha; red, O. nerka; coho, O. kisutch; humpback, O gorbuscha; chum, O. keta.

Related Subjects. The reader is referred in these volumes to the following articles:

Alaska Fish Salmon Trout Trout Whitefish

SALMON PIKE. See MUSKELLUNGE. SALMON RIVER, DAM, AND FALLS. See Idaho (Rivers).

SALMON RIVER MOUNTAINS. See IDAHO (Physical Features).

SALMON TROUT, a name applied to an American species of trout, more commonly known as the steelhead. It is found along the Pacific coast, making runs into fresh-water streams from the southern part of California to Alaska, and is especially abundant in the lower courses of the Columbia River. The steelhead averages from five to eight pounds in weight, though large specimens reach a weight of twenty pounds. Great numbers are caught in the Columbia, and are canned or sold fresh. Because of the food value of the steelhead, it is being propagated by the United States Bureau of Fisheries, and it has been introduced successfully in Lake Superior and its tributaries.

The European species inhabits salt water, but ascends fresh-water streams to spawn. See Salmon; Trout.

Scientific Names. The European salmon trout is Salmo trutta; the steelhead is Salmo gairdneri.

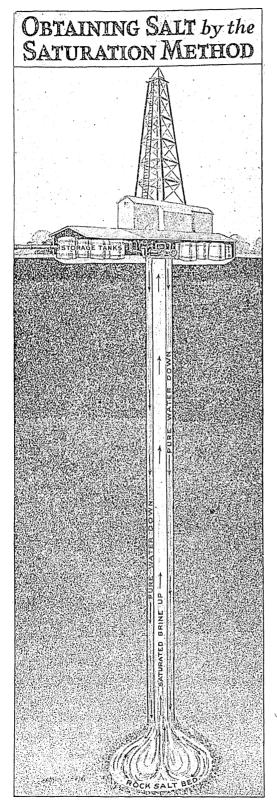
SALOL, sal' ohl, or sal' ol, a white crystalline powder composed of salicylic acid (which see) and phenol. It is odorless and almost tasteless. It does not dissolve readily in water, but is soluble in alcohol, ether, and choloroform. Salol is employed in medicine as an antiseptic.

SALOME, sah lo' me. See John the Baptist; Opera (Some of the Famous Operas).

SALOMON, HAYM (1740-1785), Jewish-American patriot who emigrated from Poland in 1772. By advancing his personal fortune and through loans negotiated with France and Holland, he rendered immense financial assistance to the Colonies in their struggle for independence.

SALON, sa lawN', a world-famous exhibition of the works of living artists, held every year at the Palaces of the Fine Arts, in Paris, from May 1 to June 22. The exhibits consist of oil and water-color paintings, sculptured





figures, engravings, pastels, and etchings. The prizes, consisting of medals and the coveted Prize of Rome (Prix de Rome), are awarded by a jury selected by ballot by the exhibitors, who are organized under the name Society of French Artists. In 1889 a new society was organized (National Society of Fine Arts), which holds an independent Salon from May 15 to July 15 in the Champ de Mars (Field of Mars). It is known as the New Salon, as distinguished from the original, or Old, Salon. The term is commonly used to designate a

The term is commonly used to designate a drawing-room assemblage of such as literary or musical notables; also any suite for the exhibition of works of art.

SALONIKA, officially Thessalonike. See Greece (Principal Cities; page 2941).

SALSIFY, sal' sih fih. See OYSTER PLANT.

SAL SODA. See SODA.

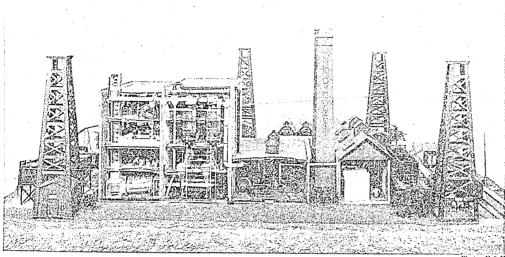
SALT. As a seasoner and preserver of food, salt has been used from earliest times in nearly all parts of the world, and the value placed upon it is closely associated with man's advance from savage and nomadic conditions of life to those of a higher civilization.

Chemically, salt is chloride of sodium, that is, a compound of chlorine and sodium, with the symbol NaCl. In mineralogy it is known as halite. In chemistry, any salt is a kind of compound formed by the action of an acid on a metal, with elimination of hydrogen. Common salt is found in nature in the oceans and salt lakes, in salt mines, and in brine springs.

Sea Salt. At one time, almost all of the common salt of commerce was produced by the evaporation of sea water, and considerable quantities are still obtained in this way in regions bordering on seas and salt lakes. Since there is slightly more than a quarter of a pound of salt in each gallon of sea water, it has been estimated that the entire ocean, if dried up, would yield about 4,419,300 cubic miles of rock salt, about fourteen and one-half times the bulk of the entire continent of Europe, mountains and all. Of the larger seas, the waters of the Mediterranean and Caribbean contain the greatest quantities of salt, but the smaller, enclosed seas, such as the Dead, Black, Red, and Caspian, and Great Salt Lake, contain an even greater proportion.

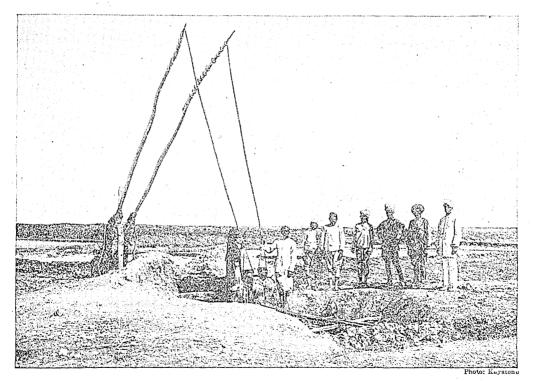
Other Sources. Most of the salt of commerce is obtained by digging rock salt out of underground beds, that is, by mining it; by evaporating the water of natural brine springs; and by evaporating artificial brine. By the latter method, water is forced into salt beds and the salt is dissolved; this is known as the saturation method. The brine is then pumped to the surface and evaporated in the open air, or by artificial heat. The solid residue is then purified for marketing.

The annual salt production of the United States (including Porto Rico) is about 7,000,000



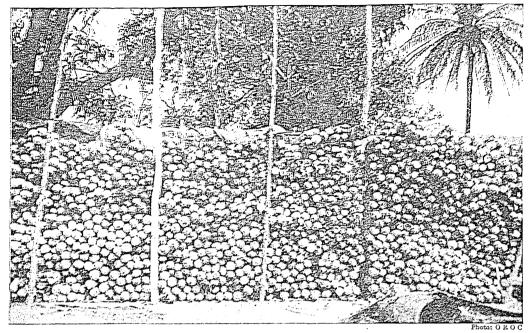
REALISTIC MODEL OF A SALT PLANT

One of the most interesting sections of the Smithsonian Institution, Washington, D. C., is that devoted to small working models of various industries. These models are constructed with the aid of operators of large commercial plants; they are equipped with electric motors which run the machinery in a remarkably natural manner, and with electric lights in color, to simulate the glow of fires and add to the realism of the display. In the illustration above, a plant for the preparation of table salt is shown. Every step is vividly portrayed, from pumping the brine from below the surface of the earth, purifying and evaporating the liquid, to preparing the finished product for the market.



WORKING A SALT WELL IN INDIA

The illustration shows a part of a comparatively small area in which there are about four hundred salt wells. By the ancient bucket method, the salt, dissolved by water, is drawn to the surface and evaporated by the sun's heat, the residue being the crystal salt.



ONE OF THE STRANGEST BANKS IN THE WORLD

Salt is comparatively scarce in the interior of Africa, and it has long been a medium of exchange, as is money in civilized communities. A bank in Central Africa is pictured above, with salt as its capital. The salt is packed in reed hampers about two feet long and three inches in diameter, and each hamper has a cash value of about two shillings sixpence (about sixty cents). Formerly, a man could buy a wife for about ten hampers, but salt is now more plentiful, and as many as thirty hampers are often demanded.

short tons, of which about 5,000,000 tons are obtained from manufactured and natural brines. The leading salt-producing states are Michigan, New York, Ohio, and Kansas. Louisiana, California, Utah, and West Virginia also produce appreciable amounts. Ontario produces the bulk of the Canadian product, evaporating the brines of a salt basin about 3,000 square miles in extent.

The richest fields in Europe are the Carpathian mines in Ostmark, where the vaulted chambers and massive pillars of salt extend thirty miles; in the lower levels of the mines, there are streets and houses for the miners. Some of the largest salt mines in the world are at Wieliczka, near Cracow. There are large deposits also in Western Germany, Russia, Switzerland, France, Spain, and Great Britain. These salt deposits often occur where there are petroleum, bitumen, and inflammable gas; at a remarkable salt spring in China, the escaping gas serves as fuel for the evaporation of the salt brine.

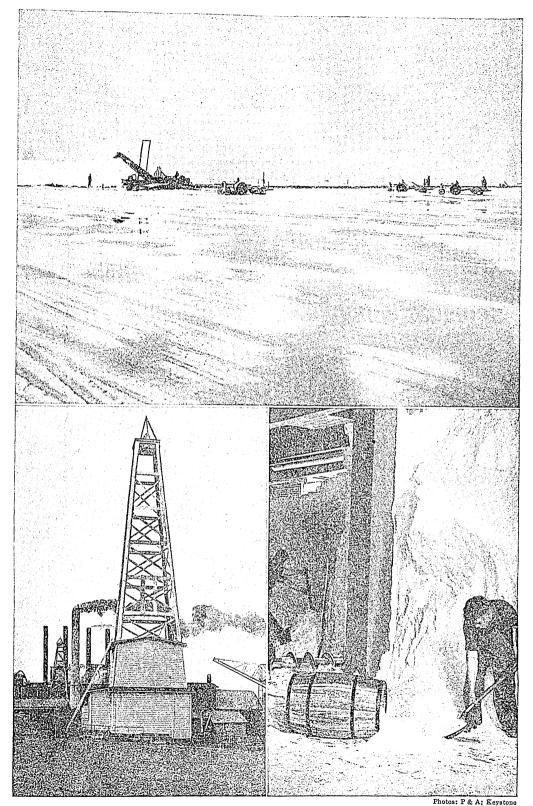
Uses. There are various grades of salt, known as table, dairy, common, fine, packer's, solar, etc. Salt is used in the largest quantities as a seasoner of food, and also in the packing and preserving of meat and fish; in the manufacture of hydrochloric acid, soda ash, sodium carbonate, and caustic soda; for hardening soaps; in the glazing of coarse pottery; and in im-

proving the clearness of glass. It is used to a limited extent as fertilizer, however potash salts are better for that purpose. It is a necessary part of the food of cattle, and wild animals obtain it from salt licks or springs, which they often travel great distances to find.

In the household, it has many uses other than as a seasoning. Salt dissolved in water is a common gargle for sore throat; it makes a good eye wash, and an effective emetic when tepid. Hot salt water for bathing is soothing and restful. See, also, SALTS.

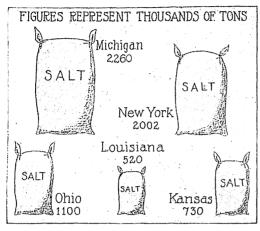
and restful. See, also, SALTS.

Historical. When cereal and vegetable foods began to be used, salt became a necessity, and since it was difficult to obtain, it naturally acquired a religious significance. A salt spring was regarded by inland peoples as a special gift from the gods, and ancient Roman historians tell us that the German tribes fought for the possession of salt streams, believing that their presence gave the region a peculiar sanctity. Salt was used by the ancient Hebrews and other Semitic peoples, and by the Greeks and Romans in their offerings, probably as a symbol of purity. The "covenant of salt" mentioned in the Old Testament was one which could not be broken, as salt symbolized perpetuity. Christ spoke of His disciples as "the salt of the earth," with reference to their spiritual influence on the world.



Views of the Salt Industry. At Great Salt Lake, in Utah, brine is pumped from the lake into great ponds, where the water is evaporated and a heavy deposit of salt remains. Tractors scrape the deposit into great piles for shipment to the refinery. Below, at left, a salt well and refining plant in New York state. At right, not a snowdrift, but a mass of refined salt in a Michigan refinery, being put into barrels.

Among the Orientals of the present day, as in the past, salt used at a meal is representative of friendship and hospitality; hence the Arab phrases, "there is salt between us," signifying friendship; "to eat of a man's salt," or



AVERAGE ANNUAL PRODUCTION

Only those states are named which produce over 275,000 tons a year. (From United States Government reports.)

to partake of his hospitality; "to sit above the salt," or in the place of distinction. In Persia, a man who is said to be "untrue to salt" is

accused of disloyalty.

As the chief religious and economic necessities of the ancient world, salt and incense were of great importance in developing the earliest highways of commerce. The salt of Palmyra and Tadmore built up the vast trade between the Syrian ports and the Persian Gulf; the great salt mines of Northern India were the center of a wide trade before the time of Alexander the Great; a caravan route united the salt oases of the Libyan desert; and to the present day, the traffic in salt forms a large part of the caravan trade of the Sahara. There was also an ancient salt trade between Aegean ports and the coasts of Southern Russia, and one of Italy's oldest roads, the Via Salaria, is the route by which the salt of Ostia was carried up into the Sabine country. Cakes of salt were anciently used as money in parts of Abyssinia and Tibet, and salt taxes existed even in ancient and medieval times. A.N.W.

Related Subjects. The reader is referred in these volumes to the following articles:

Acid Ocean
Great Salt Lake Sahara
Minerals Superstition (Folklore of Salt)

SALTAIR. See GREAT SALT LAKE.

SALT LAKE CITY, UTAH, the capital and largest city of the state and the county seat of Salt Lake County. It is the chief commercial city between Denver, 741 miles southeast, and San Francisco, 819 miles southwest, and

is the livestock center of one of the greatest sheep and cattle areas in America. There are also important mining interests. About forty per cent of the residents are of the Mormon faith, and the city is known the world over as the headquarters of that religious sect. Population, 149,934 (1940).

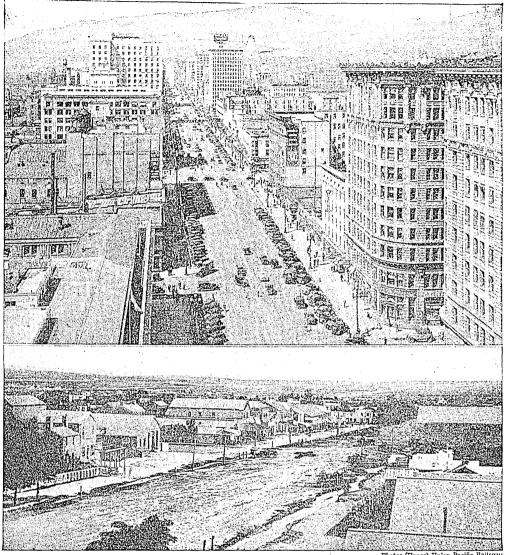
General Description. Salt Lake City is delightfully situated at the western base of the Wasatch Mountains, fifteen miles east of Great Salt Lake, which, with the exception of the Dead Sea, is the saltest body of water on the globe. Saltair Beach, at the end of a mile-long pier, affords remarkable and exhilarating bathing. One of the features of this beach is a great Moorish pavilion. The streets of Salt Lake City are unusually wide and are regularly laid out, and at the sides of many flow streams of water, fed by mountain currents, for the refreshment of lawns, parks, and gardens.

Parks, Squares, and Boulevards. Liberty Park is the largest of the city's sixteen public parks and playgrounds. The square on which stands the City and County Building marks the place where, in 1847, irrigation was first practiced in America. Wasatch, Highland, and South Temple are among the noted boulevards of the city. Fort Douglas, a United States military reservation, is located three miles east of the city.

Special Features. Near the center of the city is Temple Square, a ten-acre tract which contains the famous Mormon Temple, Tabernacle, and Assembly Hall. In the Mormon Temple, an edifice of unique architecture and towering spires, many ordinances sacred to the Mormon faith are performed. The great Tabernacle, which seats 10,000 people, has in it a pipe organ that is world renowned for volume and tonal quality. The Seagull Monument in the same square is dedicated to the vast army of seagulls which, flying in from the Pacific, devoured the crickets that in 1848 threatened to destroy the Mormons' first crops. The Administration Building is a memorial to Brigham Young, the Mormon prophet and founder of the city. At the head of State Street is the beautiful granite state capitol, completed in 1916, which contains agricultural and industrial exhibits, noted paintings, and pioneer relics.

Transportation. The city is served by six railroads—the Denver & Rio Grande; the Oregon Short Line; the Los Angeles & Salt Lake; the Western Pacific; the Southern Pacific; and the Union Pacific. Four interurban and a number of motorbus lines also connect the city with numerous attractive resorts. The Moffat Tunnel (which see), completed in 1927, shortens the rail distance between Denver and Salt Lake City by 175 miles.

Industries. Salt Lake City has established itself as the manufacturing center of the inter-mountain territory. The packing houses constitute one of the



THE GROWTH OF SALT LAKE CITY

Photo: (Upper) Union Pacific Railross

An interesting contrast is shown in the two illustrations. Below, in 1861 Main Street of the village was lined with unpretentious frame buildings. Above, today, the city is metropolitan in appearance.

most important industries. Among other industrial establishments are smelters, oil refineries, butter and cheese factories, sugar factories, canning factories, flour and woolen mills, and manufactories of crackers, confectionery, cereals, hardware, chocolate, and salt. Many industrial plants were established after the World War.

Airport. Salt Lake City has become a recognized air-mail center, having completed a new airport in 1928, operating four lines of aircraft.

Education and Institutions. The city is the seat of the University of Utah, which occupies a splendid site in the eastern section. The public school system comprises thirty elementary schools, eight lower and three upper division high schools. There are also a number of private schools of a high order. Another noteworthy structure is the state penitentiary.

History. Under the leadership of Brigham Young, a party of Mormons arrived in the valley of the Great Salt Lake on the 24th of July, 1847. The city was organized in 1851, and was called Great Salt Lake City until 1868. The commission form of government was adopted in 1911.

SALTO GRANDE RAPIDS. See URUGUAY RIVER.

SALTON, sawl' ton, SEA, a temporary lake formed in the southeastern part of California, chiefly in Imperial County, between the Santa Rosa and Chocolate mountains. According to the charts issued by the Department of the Interior in 1928, the region of this lake is the



BELOW THE LEVEL OF THE SEA

In the illustration, the point on the rock where the horizontal line appears marks its distance below sea level as 189 feet. The rock is 50 feet above the general level of Salton, according to the inscription. The bed of the sea is now 246 feet below the surface of the great ocean to the west, across the state. Various authorities give the depression as from 239 to 270 feet.

largest area below ocean level in America; it has an area of 287 square miles, and is 246 feet below the sea. It is thought to have once been covered by waters from the Gulf of California, which have since receded. However, this area is now cut off from the gulf by a ridge, on top of which the Colorado River flows.

Early in the twentieth century, a company of American capitalists began extensive irrigation operations in this territory. They excavated a channel to conduct water from the Colorado to the Imperial Valley, but took no precautions to keep the flow within its banks. In 1905 and in 1906, the river flooded the valley through the canal, emptying great quantities of water into the basin, and forming a landlocked, salty lake about 400 square miles in area. This threatened to ruin the Imperial Valley, and in time to form a sea larger than the Great Salt Lake of Utah. Such a disaster was averted by the timely work of the Southern Pacific Railway Company, the United States Reclamation Bureau, and the irrigation company originally involved. It took many millions of dollars to repair damages to property and to guide the river back to its course. All possible water inlets to the basin were dried up, and the sea is gradually evaporating, at the approximate rate of five or six feet annually.

In recent years a large portion of the Salton Sea area has been reserved as a bird refuge. See California (Waters).

SALTPETER, or NITER, a compound of potassium and nitric acid, which bears a close

resemblance to common salt in its outward appearance. In chemistry it is known as potassium nitrate (see Potassium). Saltpeter is formed in soil by oxidation of decomposing organisms, and is found in considerable amounts in certain localities in Spain, Egypt, and India. Large quantities were prepared from earth in Mammoth Cave during the War of 1812. A part of the supply for use in the arts is obtained from these natural sources, but a much larger part is made by treating sodium nitrate (Chile saltpeter) with potassium chloride.

Saltpeter crystallizes in six-sided prisms. It dissolves readily in water, to which it imparts a salty taste. It is a mild antiseptic, and small quantities are sometimes put into brine employed in preserving meat. Its most extensive use in the arts is in the manufacture of gunpowder (which see). It is also employed in the manufacture of fireworks and matches. It is valuable as a flux in smelting certain ores, and is employed to some extent in dyeing.

Chile Saltpeter is a nitrate of sodium which obtains its name from the fact that extensive beds of it are found in Northern Chile. It is also called soda saltpeter. It is extensively employed in the manufacture of nitric acid and saltpeter, and as a nitrogenous fertilizer.

T.B.J.

Chemical Formula. The formula for saltpeter is KNO_3 ; that is, a molecule contains one atom of potassium (kalium in Latin), one of nitrogen, and three of oxygen. Chile saltpeter is NaNO₃, the Na, in this latter formula, standing for one atom of sodium (natrium).

SALT RHEUM, room. See Eczema. SALT RIVER. See Arizona (The Land and Rivers).

SALTS, a name given to saline laxatives generally. The more important are *Epsom salt*, or magnesium sulphate, *Glauber's salt*, or sodium sulphate, and *Rochelle salt*, or sodium and potassium tartrate. They produce copious bowel movements, and have the common property of drawing off water from the blood. In cases of emergency, and in the treatment of certain diseases, these salts are prescribed by physicians, but best authority advises against indiscriminate use of any saline laxative.

Related Subjects. For further information on this subject the reader is referred in these volumes to the following articles:

Epsom Salt Glauber's Salt Medicine and Drugs Seidlitz Powders

SALT-WATER SOAP. See SOAP. SALTWORT. See ALKALI.

SALTYKOV, sahl teh kawf', MIKHAIL. See RUSSIAN LITERATURE (The National Period).

SALUDA RIVER, a tributary of the Santee River in South Carolina.

SALVADOR, officially EL SALVADOR, a picturesque, tropical country, the smallest but most progressive and most densely populated of Central American republics (see CENTRAL AMERICA). Salvador received its name from the Spanish adventurer Pedro de Alvarado, who conquered it in 1524. This small country averages but sixty miles in width; it occupies the Pacific slope of the mountain range that extends through Central America, and fronts on the ocean for a distance of about 170 miles. Its area is 13,176 square miles. (For colored map, see NORTH AMERICA.)

The People. Almost one and one-half millions of people live in this tiny republic, the majority of whom are *mestizos*, or people of mixed Spanish and Indian blood. There are a number of pure Indians and a few foreigners. The people of Salvador as a whole are progressive. Population, 1,787,930 (1940 estimate).

Education is nominally free and compulsory, but only about one-fourth of the children of school age are actually receiving instruction. Educational facilities in the cities and larger towns are fairly adequate, but in the rural districts, opportunities are much more limited, and the few rural schools do not go beyond the third grade. There is the National University at San Salvador, offering courses in medicine, law, chemistry, engineering, industry, pharmacy, and the social sciences. Lectures and instruction for working men are provided at the Popular University. The government has a definite program to reduce illiteracy. The language of the country is Spanish, and the dominant religion is Roman Catholic, though other creeds are tolerated.

Climate, Land, and Products. Along the coast of the republic there is a low plain about fifteen miles wide. This region is known as the hot lands, and is an area subject to fevers. The vegetation there is richly tropical, and luxuriant forests abound in valuable timbers. Balsam, from the Balsam Coast, at the west, is an important article of export.

The interior of the country is rugged—a plateau about 2,000 feet above sea level, broken by mountains and volcanic cones, some reaching heights of from 6,000 to 8,000 feet. Izalco

is the most noted of the volcanoes, and it has been active almost continuously for more than a hundred years. The south-central region around the capital, San Salvador, is especially subject to earthquakes, and that city has been destroyed repeatedly by such dis-

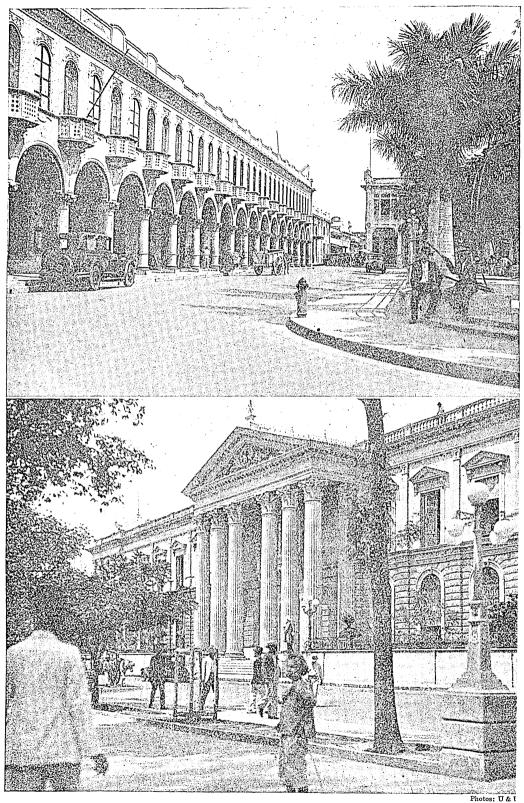


LOCATION OF SALVADOR

turbances, since the middle of the sixteenth century. On the table-lands and mountain slopes, however, 12° north of the equator, the climate is temperate, even, and healthful. From May to October is the wet season, called winter. From November to April is the dry season, or summer. The rainfall is abundant for agricultural purposes, and most of the land is under cultivation, though primitive methods are still largely employed. The principal crop is coffee, grown on the slopes of the mountains. Corn and sugar are also produced in great quantities. Other important crops are cacao, rubber, tobacco, and rice, and in the lower sections of the country, there are numerous large cattle ranches. Cotton-growing is encouraged by the government through the granting of bounties on exports. Attempts are being made at wheat cultivation, and tree-planting is encouraged.

The most fertile and most populous region of Salvador is the magnificent valley of the Lempa, the chief river of the republic. This river is the largest on the Pacific coast of Central America, and is navigable by small steamers for 100 miles of its 200-mile course. Most of the lakes are of volcanic origin. The principal ones are Guija, which belongs partly to Guatemala, and Ilopango, in South-Central Salvador.

Gold, silver, copper, iron, and quicksilver are found, and mining industries are increasing in importance. Salvador has little manufacturing except household industries, though there is opportunity for much development. Industrial



In San Salvador, the Capital City. In the upper illustration is shown the Arcade Building, in which the con 6348 sulate of the United States is located. Below, the Government Palace.

establishments include sugar refineries, distilleries, mills for cleaning coffee, starch factories, cordage works, cigar and cigarette factories, and plants for making fine cabinet furniture.

Transportation and Commerce. The economic development and stability of Salvador are considerably in advance of those of its larger neighbors. There are many good roads and railways connecting the chief ports, Acajutla, La Libertad, and La Union, with the chief cities, Santa Ána, San Salvador, and San Miguel. By 1939 Salvador's section of the Pan American highway was completed, more than one third of it in asphalt. Several additional railways are also under construction. Union, at the southeast, is considered the best harbor in Central America. Trade is chiefly with the United States, England, and France. The opening of the Panama Canal proved a considerable boon to the country's commerce. The chief exports are coffee, sugar, tobacco, indigo, henequen, lumber, rice, balsam, and hides; and the imports are cottons, hardware, flour, drugs, and chemical products.

Government and History. Under a Constitution adopted in 1886, executive power was in the hands of a President, elected by direct popular vote for four years. Legislative power was in a Congress of forty-two Deputies, elected for one year by universal suffrage. A new constitution was approved by unanimous vote of World War II. the Constitutional Congress in 1939. After until 1821, when it revolted and joined the Mexican Confederation. Two years later, it withdrew from that union, and later formed part of the Republic of Central America.

Salvador was the last of the Central American states to give up the union of Central America, and is still the chief center of the party favoring its restoration. In 1839 it became independent. Like all South and Central American states, its progress has been greatly retarded by wars and revolutions, though these wars have been more largely due to the interference of neighboring countries than to the home factions. In recent years, since outside interference is no longer so frequent, Salvador has become one of the most orderly and best governed of the Central American republics, its administration being better managed than that of its neighbor republics.

During World War I, Salvador was the only Central American republic that did not declare war on Germany, but it opened its ports to United States war vessels. It became a member of the League of Nations in 1924, and, always anxious for a better understanding among the Central American states, in the same year invited the neighboring republics to conferences to be held at Antigua, Guatemala. Early in

1921, Salvador, Honduras, and Guatemala formed a Central American Union, but this was dissolved in 1922.

In August, 1922, representatives of Salvador met with the foreign ministers of Honduras and Nicaragua on board the United States steamship Tacoma, and signed an agreement to guarantee each other cooperation in case of invasion, to establish mutual economic benefits such as free trade, unification of the tariff, currency, and communication, and to renew the treaty of peace and amity signed in Washington in 1907, with the view of eventually forming a Union of Central America. In 1923 a \$6,000,000 loan was made through a New York banking company, and was underwritten by the United States. A treaty of friendship, commerce, and consular rights was made with the United States in 1926, and the following year, Salvador, Guatemala, and Honduras made an agreement declaring a common policy in affairs of general interest in Central America.

Late in 1931 a revolution occurred in which the president was overthrown and a military government was established under Maximilano Martinez. In February, 1932, Martinez was declared constitutionally elected, and in 1939, the new constitution extended his term of office to 1945. In 1937, Salvador resigned from the League of Nations. In December, 1942, the Government declared war on Germany. See

Cities. Salvador's chief cities, other than 1524, the country was a possession of Spain ports, are in elevated sections of the country.

San Salvador, sahn sahl vah dohr', the capital, was almost wholly destroyed in June, 1917, by an earthquake and volcanic eruption. The site of the city is in a pleasant valley, twenty-five miles from the Pacific Ocean, in the heart of the earthquake region. San Salvador was twice destroyed within the century previous to 1917-in 1854 and in 1873. Each time the people rebuilt their city, and after the 1917 disaster, rebuilding plans were again started.

As the capital of the most densely populated republic of Central America, San Salvador is an important business and railway center. It has a number of manufacturing establishments, and carries on a thriving trade in coffee, tobacco, rubber, sugar, and other agricultural products. The city is one of the most attractive in Central America, with picturesque adobe houses, in a setting of luxuriant growths of fruit trees and palms, spacious parks, and tropical gardens. Among the many fine buildings are the National Palace, where the legislature holds its sessions, a handsome university building, the chamber of commerce, the Roman Catholic Cathedral, and an astronomical observatory. The city maintains several hospitals and a number of charitable institutions. Population, 107,859 (1940 estimate).

Related Subjects. The reader is referred to: Alvarado, Pedro de Latin America Pan-American Congress Central America

SALVAGE, sal' vaje, a term denoting the service rendered in preserving life and in saving property from damage or loss. It also refers to the reward for such service. Originally, salvage was restricted to losses at sea, and awards were adjusted by the admiralty courts. Salvage is awarded in the United States for ships, goods, and life saved on lakes and navigable rivers on which interstate commerce is carried, as well as for such service performed on the high seas. See DIVING (Deep-Sea Diving).

Military salvage refers to rescuing property in time of war, and usually pertains to ships and their cargoes. In large cities, insurance companies maintain paid salvage corps to save property from loss by fire. The award for salvage is determined by the risk run and the value of the property saved. In all cases, it is more than mere pay for time and labor expended, the excess being considered a reward for the effort made, and also an inducement to

others to engage in like work.

SALVATION ARMY, a religious body with semi-military organization, whose purpose is to bring spiritual and material benefit to those whom the conservative religious bodies do not reach. Its founder, "General" William Booth, who was originally a Methodist minister, finding the Church unsympathetic toward his work for the unfortunate, began holding independent meetings for the poor, in 1865, in an unused graveyard in London. The organization which resulted was at first known as the Christian Mission; it did not receive its military name and system till 1877. The Army was remarkably successful in the East End of London, from which it spread throughout the United Kingdom and then to all English-speaking countries. It was introduced into the United States in 1880, where, however, disagreements caused the organization of a new society (see VOLUNTEERS OF AMERICA). Now its activities are carried on throughout the world.

The beliefs of the Salvation Army are those of evangelical Christianity. Piety and ability are the only qualifications required of the officers. Men and women have equal rights and both are dressed in uniform. It is the custom of the members to hold meetings in the open air, gathering a crowd by means of musical instruments and singing, and later inviting the people to a hall for further services. As many of their hearers are of the destitute classes, much welfare work is necessary. The Salvation Army has a vast social service program which sponsors recreational and characterbuilding activities for both adults and children. Orphanages and industrial and rescue homes are also maintained but these institutions serve more as clearing houses for the poor. some of the larger cities, permanent lodging houses are operated, on the same plan as hotels. There are also four training schools for American workers, located in New York, Chicago, San Francisco, and Atlanta, Ga. The Army activities are supported by voluntary contributions; the official paper is the War Cry. In World War I, the services of the Salvation Army proved invaluable. Its representatives were sent in large numbers to the zones of fighting, and neither hardship nor danger deterred them in the task.

Until 1929, the founder and his son Bramwell commanded the Army. When Bramwell's health broke, Edward J. Higgins (which see) succeeded him. He retired in 1934 and the founder's daughter, Evangeline, was General until she retired in 1939, and was succeeded by George Carpenter. See Booth (family); map, page 6351.

SALVATOR ROSA. See Painting (The

Seventeenth Century).

SALVERSON, LAURA. See CANADIAN LITERATURE (English Canada: Fiction).

SALVIA, sal' vih ah. See SAGEBRUSH.
SALVINI, sahl ve' ne, TOMMASO (1829-1916), a tragedian, born at Milan, Italy. His parents were players, and they trained him in childhood for the same profession. He began to act during his fourteenth year, and at eighteen had risen to such prominence that he was chosen by Ristori to play leading rôles in her company. In 1847 he caused a sensation among Italian theatergoers in Rome by his vigorous acting in Alfieri's famous tragedy, Oreste. He left the stage in 1849 to fight in the Italian war for independence, but by 1851 was again playing

Salvini had original views as to the nature of many characters in drama, such as Hamlet and

spirited, and sometimes violent, acting.

with success. In 1868 he organized his own

company, toured Europe repeatedly, and made

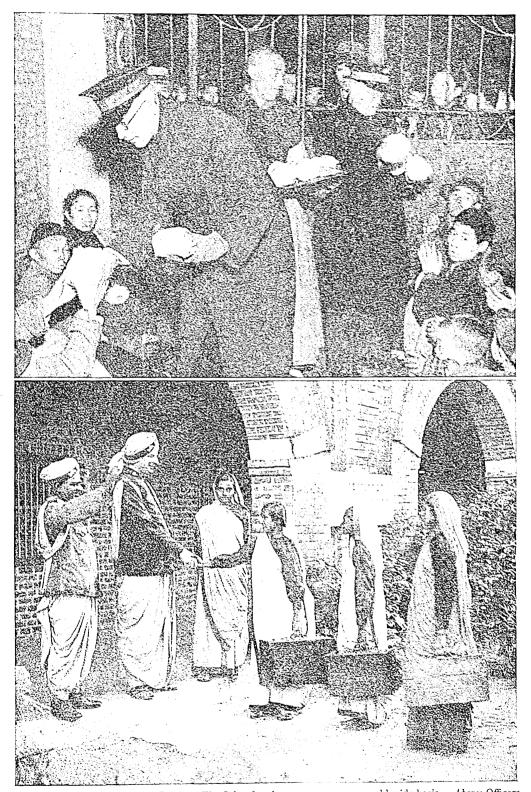
five trips to America between 1873 and 1889. Everywhere, audiences were astonished by his

Othello, whom he impersonated as vicious and unprincipled men. This attitude led to harsh criticism in both America and England, but the powerful effect of his work was never disputed. Even when he spoke Italian and the rest of the cast used English, his presentations were vividly effective. He practically retired from the stage in 1890, but during the next twelve years, appeared now and then

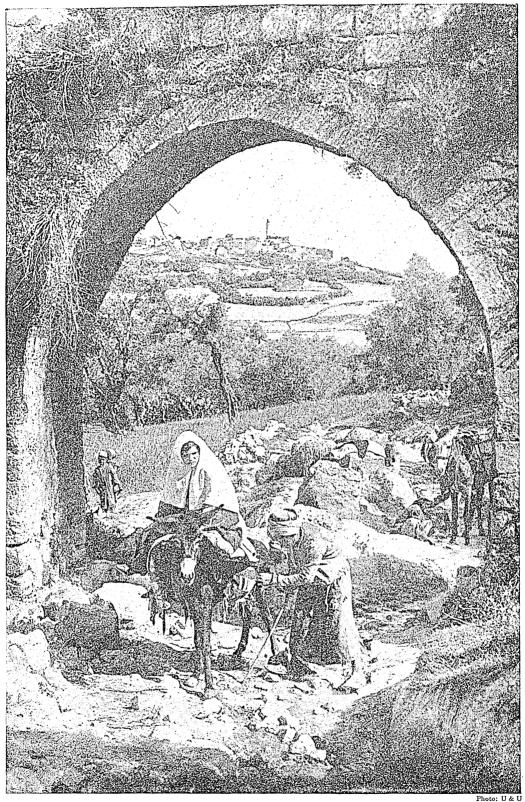


SALVIN

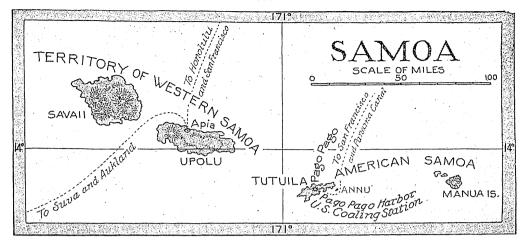
in Rome, and audiences marveled at the vigor he retained in his extreme age. His book, *Records*, *Anecdotes*, *and Impressions*, published in Milan in 1895, is considered of value to students of the European theater.



The Salvation Army in Foreign Lands. The Salvation Army operates on a world-wide basis. Above: Officers distributing hot rice to homeless and hungry Chinese. Below: At the Salvation Army headquarters, in Bombay, India, native cadets being welcomed as they come to enter training for service in their own country.



In the Land of the Samaritans. Present-day pilgrims on their way to Jerusalem pass under an arch which forms 6352 a perfect pictorial frame for Samaria.



THE SAMOAN ISLANDS

The western islands are under mandate to New Zealand since 1010, by order of the League of Nations.

SALZBURG, zahlts' boorK, a province of Austria-Hungary until 1918, and of Austria until its seizure by Germany in 1938. See AUSTRIA.

its seizure by Germany in 1938. See Austria. SAMANA, sah mah nah', BAY. See Haiti. SAMARA, sah mah' rah, a port on the Volga River. See Russia, map.

SAMARIA, sah ma' rih ah. See PALESTINE (Cities).

SAMARITANS, sah ma' rih tanz, originally, Babylonian and Assyrian colonists brought by the king of Assyria to take the places of the deported Jews, after the fall of the northern kingdom (II Kings XVII, 24). A Jewish priest was sent to teach them "the manner of the God of the land," and they gradually dropped their heathen observances and adopted the religion of the Pentateuch. They came into the land as soldiers, and increased and stayed as conquerors. They became numerous enough to demand a share in the rebuilding of the Temple, after the Jews returned from exile, but the latter scorned the proposal. Later, the Samaritans built a temple of their own, on Mount Gerizim. This was destroyed by John Hyrcanus (about 120 B.C.).

At the time of Christ, though the Samaritans dwelt in the very center of Palestine, the Jews "had no dealings" with them, because they regarded them as heretics. Jesus went through their land and held his memorable conversation with the Samaritan woman at the well of Jacob (John IV, I-26), and Philip preached the gospel later to the Samaritans. On the overthrow of Palestine by the Romans, the Samaritans shared the fate of the Jews, and were scattered abroad among different nations. A very small colony of them still persists, not more than 150 in number, in Nabius, near the ancient Samaria. See preceding page.

SAMARIUM, sah ma' rih um. See CHEM-ISTRY (The Elements). SAMARKAND, sam ahr kant'. See UZBEK. SAMBRE, sahN' br', RIVER. See Belgium (Rivers).

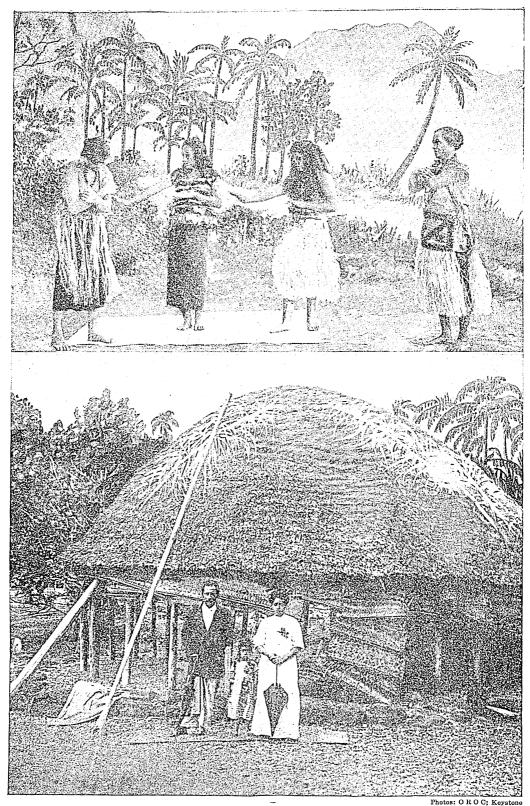
SAMBOS. See PERU (The People).

SAMECH, the Phoenician name for the letter X (which see).

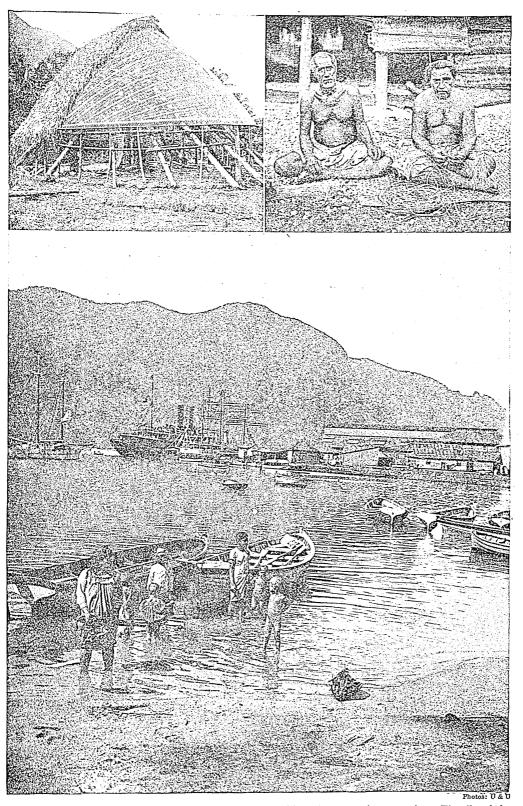
SAMBUKE, sam' buke. See Elder.

SAMNITES, an ancient Italian people of Sabine origin, who lived in the mountainous region of Southern Italy. They were divided into four nations: the Caraceni, in the north; the Pentri, in the center; the Caudini, in the southwest; and the Hirpini, in the south. After four terrible conflicts with the Romans, the Samnites were almost exterminated. See Rome (History).

SAMOA, sah mo' ah, or SAMOAN IS-LANDS, an archipelago of fourteen islands in the South Pacific Ocean, 4,200 miles southwest of San Francisco, and over 2,400 miles northeast of Sydney, Australia (see colored map, with the article PACIFIC ISLANDS). islands are nearly all of volcanic formation, and are enclosed by coral reefs. They have a combined area of about 1,100 square miles. At the outbreak of the World War, in 1914, the Samoan archipelago was owned partly by Germany and partly by the United States, the dividing line being the 171st parallel of longitude. On August 29, 1914, a British force from New Zealand occupied Apia, a port of the German island of Upolu, and in 1920 all of German Samoa was brought under the administration of New Zealand, by mandate of the League of Nations. It is officially known as the Territory of Western Samoa. The most important of this group are Savaii, 700 square miles in area, and Upolu, about 430 square miles. These are the two largest islands in Samoa. Upolu was for years the home of Robert Louis Stevenson (see page 6833), and his grave is on Mount Vaea, near Apia, the chief town and administrative center.

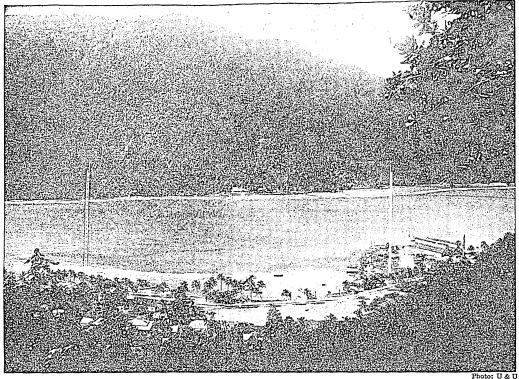


Life in Picturesque Samoa. (I). Girls in an exhibition dance at Pagopago. Man and wife in the island of Tutuila; in their dress they show the influence of American manners and customs. 6354



Life in Picturesque Samoa. (II). At upper left, a native residence in course of construction. The ribs of the roof are bound with coconut fiber rope; the roof is of palm leaves. At right, rope-making. Below, the United States naval station at Pagopago.

6355



UNITED STATES GOVERNMENT RADIO STATION ON TUTUILA

Tutuila and all other American Samoa. Samoan islands east of the 171st meridian, west longitude, came into the possession of the United States in 1900, according to a treaty negotiated by the United States, Germany, and Great Britain, though America had had a naval and coaling station on Tutuila since 1872. Tutuila has an area of about forty-four square miles, and a population of 10,464 (1941); it is the most attractive island of the group, and has the only good harbor in Samoa, that of Pago Pago. The United States maintains a naval station on Tutuila. The government of the islands is under the jurisdiction of the United States Department of the Navy. The other American islands, the Manua group, have a combined area of twenty-five square miles. The total population is 13,273 (1941).

General Description. Most of the islands are very beautiful, with picturesque mountains, luxuriant forests, fertile valleys, and flat lands sloping toward the sea. The climate is pleasant, being most variable from May to November, although gales and hurricanes occur from January to March. In 1889 two American and two German warships were beaten to pieces on the beach at Apia, in a memorable storm which Stevenson describes in A Footnote to History. The forests are remarkable for the size and variety of their trees, and the luxuriance and beauty of the creepers, tree ferns, and

parasites. There are sixteen varieties of the coconut palm and twenty varieties of breadfruit tree, which provide the natives with their principal food. Copra, the dried meat of the coconut, is exported. There are no animals except a native rat, four species of snakes, and a few birds. The native Samoans on all the islands, who number about 70,000, are the best type of Polynesians-tall, well built, brownskinned, and good-looking. They are simple, honorable, generous, and hospitable. They are all Christians, but their reactions to Christianity do not take the form of belief or emotion; with them it is a highly elaborate social form, corresponding to the lodge meeting or the club.

SAMOS, sa' mahs, an island in the Aegean Sea, Greek possession of which was confirmed by the Treaty of Lausanne (1923). Samos is situated in the Grecian Archipelago, and is separated from the coast of Asia Minor by the Strait of Little Boghaz. It formerly belonged to Turkey. The area is about 180 square miles, and the population, almost entirely Greek, is 77,858 (1938 estimate). The capital, Vathy, is situated near the site of ancient Samos, a magnificent city in the times of ancient Grecian power.

Olives, grapes, and other fruits are cultivated; oil, wine, silk, cotton, and figs are exported. The island contains considerable mineral wealth, marble, silver, iron, lead, and emery being found, but not extensively worked. See Aegean Sea.

SAMOTHRACIAN, sam o thra' shan, MYSTERIES. See MYSTERIES.

SAMOYEDS, sam o yedz'. See Asia (Northern Asia: Its Inhabitants); Russia (The People).

SAMPSON, WILLIAM THOMAS (1840-1902), an American naval officer, prominent in the Spanish-American War. He was born in

Palmyra, N. Y., the son of Irish immigrants. In 1857 he was appointed midshipman in the United States Naval Academy, and was graduated in 1861, just at the beginning of the War of Secession. The next year he was advanced to the rank of second lieutenant. Later, as executive officer on the Patapsco, he was ordered to clear the Charleston harbor of mines and torpedoes, and succeeded in entering the harbor, but his ship was blown up, and Sampson was rescued 150 feet from the wreck. He was then made lieutenant



Photo: Brown Bro

REAR ADMIRAL SAMPSON
Because he was not present
during most of the Battle
of Santiago and the successful encounter was directed by Commodore
Schley, the partisans of
each engaged in a bitter
controversy over the question of honors for the
victory.

commander, and served on the flagship of the European squadron. From 1867 to 1871, he was an instructor in the Naval Academy.

In 1880 Sampson was made captain of the first modern steel cruiser, and in 1897 was commander of the battleship *Iowa*. At the outbreak of the Spanish-American War, in 1898, he was given charge of the North Atlantic squadron, and was commander in chief of the United States naval forces off the coast of Cuba. Sampson was in charge of the blockade of Santiago Harbor, but while he was on the way to Siboney to confer with General Shafter, commander of the land forces, the Spanish fleet attempted to escape, and Sampson reached Santiago only in time to witness the last of the battle, which in his absence had been directed by Winfield Scott Schley. This episode caused bitter controversy between partisans of the two officers, but in 1899 Sampson was advanced to the rank of rear admiral.

Sampson held many positions of trust, among others those of assistant superintendent of the United States Naval Observatory, superintendent of the Naval Academy, delegate to the

international maritime conference, presiding officer on the board of inquiry into the sinking of the *Maine*, and member of the commission to arrange for the evacuation of Cuba.

Related Subjects. The reader is referred in these volumes to the following articles:

Schley, Winfield Scott Shafter, William Rufus Spanish-American War

SAM SLICK, the pen name of Thomas Chandler Haliburton. See Canadian Literature (English Canada).

SAMSON, a popular hero and the last of the tribal judges of the ancient Hebrews, was famed for remarkable strength. The story of his life is told in the Bible in chapters XIII to XVI of the book of Judges. (See next page.)

Before his birth, Samson's mother was commanded by an angel to bring up the child as a Nazarite, or consecrated one, which meant that he must never drink wine, eat "unclean things," or cut his hair. When Samson fell in love with a Philistine woman and she proved faithless, he took revenge by setting fire to the fields and vineyards of her people. The Philistines retaliated by forcing Samson's countrymen to surrender him into their power. Then "the Spirit of the Lord came upon him"; he broke his bonds, and with the jawbone of an ass, killed a thousand of his enemies. Later, they conspired to recapture this dreaded foe by locking the city gates of Gaza to prevent his escape, but he tore out doors, posts and all, and carried them to a hilltop forty miles away. See GAZA.

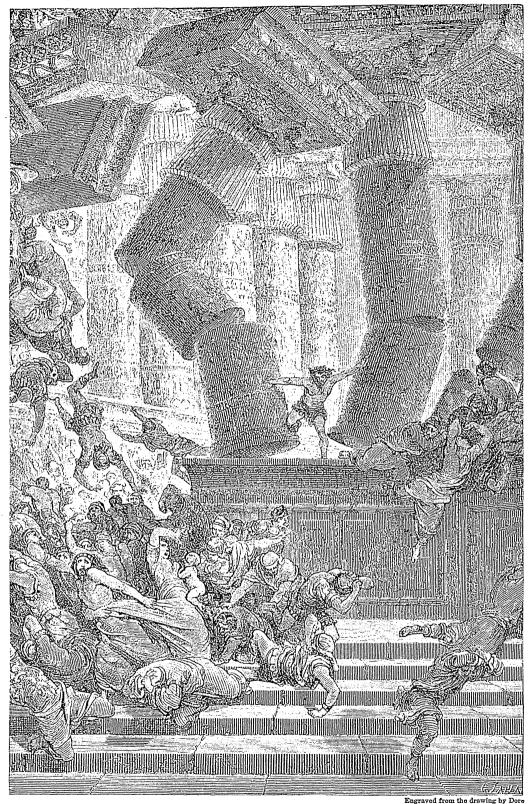
Samson's downfall finally came about through a Philistine woman named Delilah (which see). Coaxing from him the secret that his strength lay in his unshorn locks, she treacherously cut them off while he slept. He was imprisoned and blinded. When the great festival of their god Dagon arrived, the Philistines gathered by thousands in the temple to gloat over Samson's defeat. But during his captivity, his hair had again grown long, bringing back his former might, and, with a prayer for power, he pulled down the two great pillars which supported the roof. The temple collapsed, and thus "the dead which he slew at his death were more than they which he slew in his life." According to Biblical history, this happened in III3 B.C.

Influence in Literature and Myth. The life of Samson forms the basis of Milton's drama, Samson Agonistes, and also of the opera Samson and Delilah, by Saint-Saëns. Many students find in the story traces of ancient sun myths, and some compare his exploits to the famous Twelve Labors of Hercules in Greek mythology; in fact, Samson is often called "the Jewish Hercules."

SAMSON AND DELILAH. See OPERA (Some of the Famous Operas).

SAMSUN. See TURKEY (The Cities).

SAMUEL, sam' u el, the earliest of the Hebrew prophets after Moses, and the last of the



The Final Tragedy of Samson. "So the dead which he slew at his death were more than they which he slew in 6358 See Judges xvi, 31.

judges of Israel, who freed his country from foreign oppression and idolatry. Although born in Ramah, he was taken to the tabernacle at Shiloh while still a young child, by his mother, Hannah, who had promised that he should be consecrated to the service of God. There the boy grew to manhood under the guidance of the high priest, Eli (which see). When Samuel was about twelve years old, God revealed to him the approaching doom of Eli's house, and by the time the boy had grown to manhood, all Israel knew that he was to be a prophet of the Lord. Twenty years after Eli died, Samuel led his people to Mizpah, where they prayed and fasted until the Philistines suddenly attacked them. By the aid of God, the Israelites gained such a victory over their enemy that they never dared to invade the land again while Samuel was at the head of affairs. From that time on, the people, who had been gradually reforming under their leader's guidance, faithfully worshiped God.

When Samuel was old, he made his two sons judges at Beersheba, but because they proved unworthy of their trust, and on the request of the Israelite elders and people, he anointed Saul as king. Later on, God was displeased with the actions of Saul, and told Samuel to anoint David as ruler. Soon after this, while David was still a fugitive from Saul, Samuel died and was buried in Ramah, all Israel lamenting his loss. According to Hebrew chronology, he lived from 1165 to 1060 B.C.

The Books of Samuel, which were originally one book written by some unknown author, relate not only the life of Samuel, but also describe the reigns of Saul and David, the two kings whom he anointed. They form two books of the Old Testament at the end of the period of judges, and were probably written by some prophet before the fall of Jerusalem.

SAMURAI, sah moo ri', the military class during the feudal period in Japan. Originally applied only to the military guards of the mikado's palace, the term later was used to describe the whole military system of the country, which included the shogun, or commander in chief; the daimios, or feudal nobles, holding land in exchange for military service; and their retainers, the samurai proper, who were the privileged "two-sword" men, the great fighters of the country.

When the feudal system was abolished, in 1871, the daimios gave back to the emperor the lands they held, and received pensions for themselves and their retainers. The wearing of swords was prohibited, and the samurai and daimios became the "nobility" and "gentry" of Japan. In 1912 General Nogi, a famous Japanese of the samurai class, followed an old samurai custom by committing suicide, along with his wife, as a token of grief at the death of Emperor Mutsuhito. One of the privileges of

the samurai was that of committing suicide by hara-kiri (which see), rather than live to face dishonor. See JAFAN (Religion). See also Noor, MARESUKE.

SAN'A, soh noh', capital of Yemen (which

see).

SAN ANGELO, son on' je le, Tex. See

Texas (back of map).

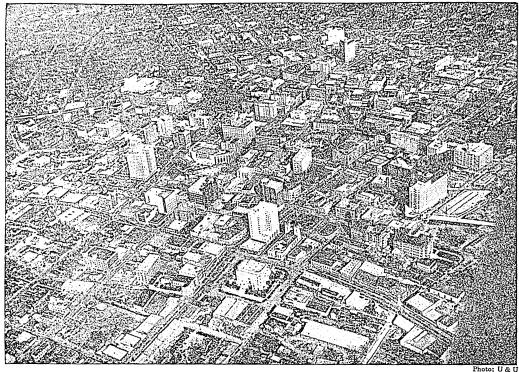
SAN ANTONIO, on to' nih v, Tex., called "the gateway to Mexico," is situated on the San Antonio River in Bexar County, 150 miles from the Gulf of Mexico. It covers an area of thirty-nine square miles, on a level plateau about 700 feet above sea level. With an average temperature of 60° F., San Antonio has a semitropical climate, with sunshine almost every day. San Antonio follows Houston and Dallas in order of size in the state. Population, 253,854 (1940).

General Description. In this city of contrasts, one sees skyscrapers towering over ancient, rambling adobe huts; a sleepy little burro trotting beside a huge limousine; or hears a softly strummed guitar playing La Paloma near a mansion in which strains of jazz are coming from the radio. On many street corners are the outdoor tamale and chili stands beloved by the dark-skinned Mexicans. The atmosphere of the old days of Spanish rule lingers everywhere. The sacred Alamo (which see) stands among the cottonwoods, for which it was named, in the very heart of the city. It was erected in 1718 by Franciscan monks and was originally a chapel. Within its gray stone walls occurred the massacre of March 6, 1836. Four historic Spanish missions near San Antonio were built between 1720 and 1731. All are well preserved and two are still used as churches. San José, with its wonderful carved window and door, is the largest and one of the

most beautiful missions in America.

Fifty-six parks and plazas, comprising 2,000 acres, are scattered over the city. Brackenridge, the largest park, is famous for its lily pond and sunken garden. In the center of the city are Alamo Plaza, Military Plaza, and Main Plaza. Olmos Dam, built after the devastating flood of 1921, has along its top a broad driveway, from which there is a splendid view of the city.

Dash and color are added to San Antonio by troops of bronzed cavalrymen, and the mimic warfare exhibitions and brilliant social events of the largest and most varied military establishment in the United States. Aircraft hum and roar in huge formations overhead. Planes rise from Randolph Field, one of the largest aviation fields in America; from Duncan Field, an intermediate air depot; or from Brooks Field and Kelly Field. Camp Stanley is the maneuver ground for artillery; Camp Bullis, the artillery and rifle range, is large enough to stage maneuvers in which every branch of the



AN AIRPLANE VIEW OF SAN ANTONIO

army is represented. One of the oldest military establishments is the Arsenal, effective in the midst of beautiful grounds. Fort Sam Houston, the home of the Second Division, is the headquarters of the Eighth Corps Army Area.

Transportation. San Antonio is the largest city on the Missouri Pacific Railroad between Saint Louis and Mexico City. It is also on the Southern Pacific, and the Missouri, Kansas & Texas railroads. Stinson Field, a first class municipal airport recently improved, is a logical stopping place for airplanes flying between the Atlantic and Pacific coasts and between Central American and Mexican cities and American centers of population. Excellent roads have encouraged motorbus transportation. Approximately 150 buses leave San Antonio every twentyfour hours.

Industry. The city is the distributing point and retail center for Southwest Texas and Northern Mexico. It is located near a great livestock and agricultural country, and all kinds of fruit, vegetables, and great quantities of cotton and pecans are grown. The dairy and flour-milling industries are extensive. There are about 350 factories, the most important making iron and steel, candy, textiles, cigars, leather goods, clothing, and soap. There are deposits of oil and natural gas in the vicinity.

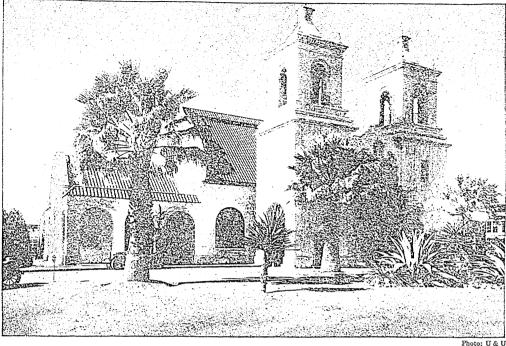
Randolph Field, located on a 2,300 acre site, 15 miles northeast of the city, is one of the largest air-training centers in the world; \$25,000,000 has been expended on this field within the past few years.

The United States Army is replacing temporary barracks constructed during the war at Fort Sam Houston and Camp Travis with permanent buildings.

The United States Government spent more than \$100,000,000 in San Antonio for payrolls, subsistence. and construction annually during World War II.

History. Since early French and Spanish explorers claimed San Antonio, the city has been under six flags—Spanish, French, Mexican, Texan, Confederate, and United States. In 1718 the first permanent settlement was made by fifty Spaniards, who established the Mission San Antonio de Valero, later known as the Alamo. Thirteen years later, the colony was officially recognized as the first civic settlement in Texas. See page 7127.

While Spanish royalists and Mexican revolutionists were struggling to possess San Antonio, independent, adventurous Americans, who had been pushing westward, arrived in the city and began plotting to free it from their control. The rebellious Texans freed San Antonio, but were punished by the Mexicans under Santa Anna. One hundred and eighty-two Texans faced 4,000 Mexicans in the siege of the Alamo, and were massacred when the fort fell, in 1836. Two months later, the heroes were avenged, for after the Battle of San Jacinto, Texas became a republic and San Antonio was forever free from foreign rule. San Antonio became a military center during the Mexican War; grew in military importance during the War of Secession; was a base of supplies for the United States army sent to the



A RAILROAD STATION IN SAN ANTONIO

The architectural style was borrowed from that of the old Spanish missions on the outskirts of the city.

border during the Mexican campaign in 1012 and 1913; and during World War I was made the greatest military center in the United States. See Texas (History).

SAN ANTONIO DE PADUA, san an to' ne o de pad' u ah. See California (Religion).

SANATORIUM, another name for sanitarium (which see).

SAN BERNARDINO, san bur nahr de' no, CALIF. See CALIFORNIA (back of map).

SAN BERNARDINO, MOUNT. See CAL-IFORNIA (Surface Features).

SAN BUENAVENTURA, san bu' nah ventoo' rah. See CALIFORNIA (Religion).

SAN CARLOS BORROMEO. See CALI-FORNIA (Religion).

SANCHO PANZA, san' ko pan' zāh. Don Ouixote.

SANCTUARY, RIGHT OF. See ASYLUM.

SAND, an incoherent mass, whether or not stratified, of mineral grains, not exceeding onefiftieth inch in diameter. Nearly all sand is derived from the disintegration of rock, and much of it from larger fragments that have been reduced in size by prolonged wear. Many square miles of beaches and deserts are covered with sand, which in places has been heaped by the wind into dunes, some of which are considerable hills. Ordinary sand is composed largely, and some sand wholly, of quartz. Much sand, however, contains numerous grains of other minerals, especially feldspar, mica, hornblende, augite, garnet, zircon, magnetite, and ilmenite; and some sand is composed almost wholly of some mineral other than quartz. "Black sand" consists largely of metallic oxides, especially magnetite, and of native metals; some black sand is rich in gold, platinum, or other heavy metals. When sand is cemented into coherent rock by some mineral, it becomes sandstone. Sand is used as a scouring agent, in filters, in the manufacture of glass and other materials capable of being molded, and in making plaster, mortar, and cement.

Related Subjects. The reader is referred in these volumes to the following articles:

Dune Glass Sandstone Feldspar Quartz

SAND, sahNd, GEORGE (1804-1876), a French novelist whose real name was Arman-TINE LUCILE AURORE DUPIN DUDEVANT. She was born in Paris. Her father was a French officer, and her early childhood was spent among the rough soldiers of his regiment. Strictly speaking, she received no education. Between her eighth and fourteenth years, she lived in the country near Nahant, France, and learned a little of literature, Latin, and Italian. In 1822 she married a country squire, M. Dudevant, and lived an uncomfortable life for nine years. She separated from him in 1831, partly because of his habits, but far more because of the wide difference in their tastes and intellectual abilities. She gave him practically her entire fortune, and received in return a

yearly allowance of six hundred dollars, gladly choosing freedom at such a sacrifice; then she went to Paris, where she began to write for the newspaper *Figaro*. There she met Jules San-

deau, with whom she lived for several years; they collaborated in the writing of her early books. The couple used the pen name Jules Sand, but when she wrote her first novel, Indiana, independently, she changed the pen name to GEORGE SAND. Madame Sand won the friendship of many famous personages of her day, notably Alfred de Musset and Chopin.



Photo: Brown Bro

GEORGE SAND

Indiana caused much excitement and numerous literary and legal discussions, because of its arguments against the continuance of marriage vows after affection is dead. George Sand fully lived up to her doctrines of freedom, and passed with surprising quickness from one lover to another. In spite of her many courtships, she found time to write methodically and rapidly, with the result that she was one of the most prolific of all women authors.

Literary Career. Her work may be divided into five periods. Previous to 1836, she wrote such novels as Lélia, Jacques, André, and Metelle, dealing with misplaced love and with herself idealized as the heroine. Then, in the second period, from 1836 to 1840, she became interested in socialism and produced such stories of ideal government as Mauprat, The Seven Strings of the Lyre, and Gabriel. The third period, extending to 1847, deals with rather uninteresting political speculations, Consuelo and The Countess of Rudolstadt being exceptions. In the fourth period, she returned to her love of nature and wrote exquisite descriptions of rural life in Little Fadette and The Snow Man. During the last years of her life, she dealt once more with analysis of character and emotions in such novels as The Marquis of Villemer and Flamaraude. In Lucrezia Floriani, the principal characters are said to be herself and Chopin. She had an extraordinary sympathy for her fellow beings, an almost unsurpassed ability in portraying the progress of love, and the artist's genius for creating glowing descriptions.

SANDALS. See illustration, in the article Costume.

SANDALWOOD, a costly, fragrant wood yielded by several species of trees growing in the East Indies and other tropical islands. The variety most generally seen is white sandalwood, but yellow and red sandalwoods are also marketed. Sandalwood is used in making cabinets and chests and small objects of an ornamental nature, such as fans and fancy

boxes. Incense sticks are also made from it. Because of the heavy fragrance of the wood, insects will keep away from clothing stored in sandalwood chests. Sandalwood oil, obtained by distillation, is used in perfumes and medicinally. The heartwood of red sandalwood yields a coloring matter used in dyeing wool; it is also employed as the basis of certain tooth powders.

Classification. Sandalwood belongs to the family Santalacea, the white species is Santalum album.

SAND BURR, OR BUR GRASS, an annoying prickly weed, native to the plains of the Western United States, and found growing in sandy regions in almost all temperate and tropical countries. The plant has stems from one to two feet long, bearing spikes of ten to twenty spiny burs, which cause painful wounds when they enter the flesh. A closely related species common in the South is the *cockspur*. B.M.D.

Classification. These plants belong to the genus Cenchrus in the grass family, Gramineae.

SANDBURG, CARL (1878-), an American poet of the Middle West, biographer, and collector of folk songs, was born at Galesburg, Ill. His life, after his student years at Lombard College, in Galesburg, was full of widely varied activities, including day labor in his wanderings over almost every section of the country, Spanish-American War service, work as magazine editor in Chicago, as foreign correspondent in Stockholm, and as editorial writer for the Chicago *Daily News*. He was a lecturer at the University of Hawaii in 1934 and, beginning in 1941, a columnist for the Chicago Times Syndicate.

His poems, which first achieved recognition in 1914, are among the few successful interpretations of the modern industrial metropolis, and of the ceaseless activity of the Middle West and its workers. They are characterized by their ruggedness and their independence of conven-

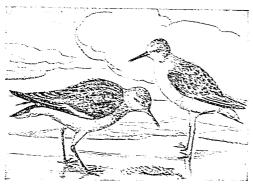
tional poetic forms.

Abraham Lincoln: the Prairie Years (two volumes, 1926) and Abraham Lincoln: the War Years (four volumes, 1939), a graphic and exhaustive delineation of the man and his times, required twenty years of research and writing. For The War Years the author was awarded the Pulitzer history prize in 1940. A noted folksong recitalist, Sandburg published the American Songbag, a collection of American folk songs with editorial comment.

Other Works include Chicago Poems; Cornhuskers; Smoke and Steel; Slabs of the Sunburnt West; Rootabaga Stories; Rootabaga Pigeons; Potato Face; Early Moon; Mary Lincoln, Wife and Widow (co-author); The People, Yes; Good Morning, America; and Storm Over the Land.

SAND DUNES. See DUNE; INDIANA; SAND. SANDEAU, saN' doh', Jules, collaborator with George Sand in literary work. See SAND, GEORGE.

SANDERLING, a bird belonging to the same family as the snipes and sandpipers, but distinguished from these birds in having but three toes. It is a true beach bird, and is usually found on shores washed by the sea; its food



SANDERLINGS

consists of small shellfish and marine insects washed up by the tide. In America the sanderling breeds in the Arctic regions, but after August it winters from California and Texas to southern South America and various Pacific islands. It is about eight inches long. In winter the plumage is hoary-gray on the upper parts, and pure white beneath. The three or four eggs are of a brownish-olive color, speckled with darker markings, and are laid in a tuft of weeds or in a depression lined with dry grass. See SANDPIPER.

Scientific Name. The sanderling belongs to the family Scolopacidae; its scientific name is Crocethia

SAND-GLASS, an old name for hourglass (which see).

SANDHILL CRANE, a long-legged, longnecked, grav crane. See CRANE.

SAN DIEGO, de a' go, CALIF., the county seat of San Diego County, is situated almost in the extreme southwestern corner of the United States, 132 miles southeast of Los Angeles. It is located on the only landlocked deep-water harbor between the Panama Canal and San Francisco Bay, and is the headquarters of the Eleventh United States Naval District. Population, 203,341 (1940).

San Diego is modern, yet with the atmosphere and charm suggestive of the Spanish period in America. Of several beautiful public parks, Balboa, containing 1,400 acres, is the most noteworthy. Here, in 1915-1916 was held the Panama-California Exposition, and in 1935-1936 the California Pacific International Exposition. Many of the collections from these fairs have been retained. World-famous resorts located near the city are La Jolla, Del Mar, and Coronado. The San Diego Zoological Gardens are among the largest in the United States and contain many rare exhibits. On Point Loma,

part of which is owned by the United States Government, are Fort Rosecrans and coaling, quarantine, and wireless stations. Here also are the Naval Training station and the United States Marine Corps base. In the southern end of the bay is the United States Destroyer Base. San Diego Bay is the base for the cruisers, destroyers, aircraft carriers, and submarines of the United States Battle Fleet.

San Diego has been termed the "cradle of Western aviation," because of the navy flying at the Naval Air Station on North Island. One of the largest aircraft manufacturing plants in the nation is in San Diego. The first nonstop flight across the continent, made by Kelly and Macready, ended here. The Spirit of Saint Louis, the monoplane in which Charles A. Lindbergh flew to Paris, was built here. The first air mail and express to be carried in the United States was carried between Los Angeles and San Diego by the United States Navy. The first air photographs and the first seaplane

flight were all made here.

San Diego de Alcala, founded in 1760 by Father Junipero Serra, was the first mission in California (see California [Religion]). Restored in 1931, it stands five miles north of the modern city. Old Town, the first settlement, stood west of the mission, and is part of the present city. Here the American flag was first raised in California. A few of the old adobe dwellings remain, the best-known of which is the Estudillo Home, where Helen Hunt Jackson had her heroine, Ramona, marry. Fort Stockton was established in 1846 by Commodore Stockton, who took possession in the name of the United States. Modern San Diego was incorporated in 1872. See page 6364.

Railroads. The Atchison, Topeka & Santa Fe Railroad enters the city from the north, and the San Diego & Arizona Eastern Railroad (part of the Southern Pacific System) from the southeast.

Industry. San Diego has over 285 manufacturing plants and more than 200 other industrial plants. The chief industry is aircraft manufacturing, with fish canning second. Other important industries are boatbuilding; manufacture of onyx, novelties, and salt; and packing of olives, pimientos, and other foodstuffs.

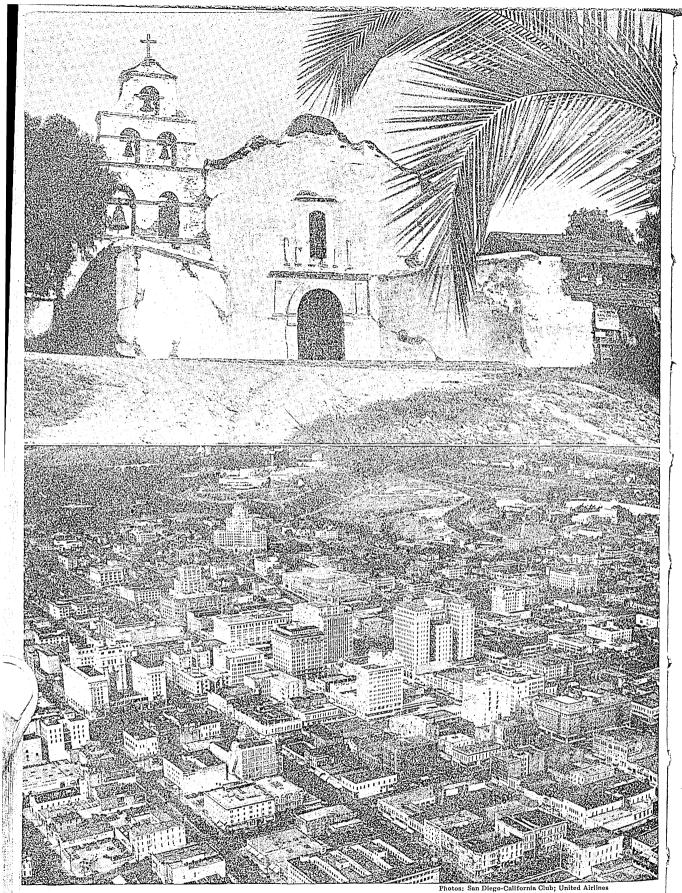
Education. The Scripps Institution of Oceanography at La Jolla, a branch of the University of California, is the only one of its kind in America, and one of the few in the world. The work done there consists of the collection of data and specimens relating to the ocean, and research based on them.

In addition to the public schools, the educational institutions include San Diego State College, Brown Military Academy, Bishop's School for Girls, Balboa Law College, and several aviation schools. H.R., JR.

SAN DIEGO DE ALCALA. See CALIFORNIA (Religion).

SAND MARTIN, OR BANK SWALLOW. See SWALLOW.

SANDÖ ISLAND. See FAROE ISLANDS.



IN AND NEAR SAN DIEGO

About five miles out of San Diego, Calif., stands the historic old Mission San Diego de Alcala (above). Built in 1769 under the supervision of Father Junipero Serra, it was the first of the many missions erected by the Spaniards along the California coast. The first American flag flown in California was raised in Old Town, the near-by settlement from which modern San Diego has grown. Below: An aerial view of the downtown district of San Diego, one of California's chief cities, widely known for its unusual beauty and semitropical climate.

SAN DOMINGO, a name sometimes applied to the republic of Santo Domingo (which see).

SANDOW, EUGENE (1867-1925), was a devotee of physical culture. Although he weighed only 186 pounds and was of average heightfive feet eight inches tall-he was remarkably strong. Sandow was a native of Königsberg, Germany. Born of ordinary-sized parents, as a child he was frail and sickly. He undertook exercises to restore his health, and when ten years of age, visited Rome with his father, where the statues of the perfect men he saw impelled a desire to make his own body perfect. It was his parents' wish that he enter the priesthood, but upon his return to Germany. from Italy, he turned seriously to the study of anatomy and devoted much time to building up his muscles by scientific methods. So much did young Sandow's father disapprove of his son's choice of vocation that he cut off his allowance. The youth then joined a traveling circus, where he posed as a model. Later, he was the model for one of the figures of a statue, Combat du Centaure, by Gustave Crauck.

Sandow subsequently toured Europe and the United States. One of his dramatic feats was supporting dumb-bell baskets, in each of which a man was concealed. He would place his feet in two clamps, bend backward, and raise a horse over his head. He could hold a man in the palm of his hand and lift him up on a table. He did back somersaults with a fifty-six-pound weight; and he tore three packs of playing cards in two.

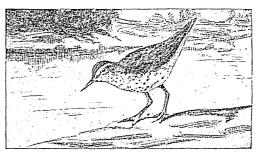
After giving up his tour exhibitions, he established physical-culture schools in England. He became a naturalized Englishman, and for a time was "professor of scientific and physical exercise to King George." During the period of World War I, he gave much time to the physical training of British recruits. His death is attributed to his attempt to raise an automobile from a ditch after an accident.

SANDPIPER. There are a large number of species belonging to the bird group called sandpiper, but, in general, they are small shore birds with long, sensitive bills, with which they probe in the soft mud or sand for worms, shrimps, and soft mollusks. They often follow receding waves, singly or in flocks, searching for delicate bits of food, and their graceful movements and cheerful cries have endeared them to many an observer. Celia Thaxter wrote a charming poem beginning:

Across the narrow beach we flit,
One little sandpiper and I;
And fast I gather, bit by bit,
The scattered driftwood, bleached and dry.
The wild waves reach their hands for it,
The wild wind raves, the tide runs high,
As up and down the beach we flit,
One little sandpiper and I.

Sandpipers are found in all parts of the world; some species nest within the Arctic Circle. The eggs, three or four in number, are a light gray, buff, or olive, boldly spotted with dark brown. The plumage of the birds, of varying shades of buff, brown, gray, white, and black, is modest but pleasing.

The *spotted sandpiper*, which breeds throughout the United States and Canada, is one of the best-known American species. The *Bar-*



SPOTTED SANDPIPER

tramian sandpiper, commonly called upland plover, is a useful insect-eating bird found on dry uplands of the United States and Canada, and was formerly slaughtered in great numbers. It is now protected throughout the year. There are numerous other species, closely related in appearance and habits.

D.L.

[The food of the sandpiper is outlined in the chart in the article Ployer, page 5659.]

Scientific Names. Sandpipers belong to the family Scolopacidae. The spotted sandpiper is Actitis macularia; the Bartramian is Bartramia longicauda-

SANDSTONE is a rock composed of grains of sand cemented together by some substance, which may be carbonate of lime, silica, or iron. The particles of sand in many cases were cemented under great pressure and under the influence of heat, though the temperature was not high enough to melt the substances. In the United States, sandstone is found in large quantities in Northern New York, in Ohio, Pennsylvania, California, Washington, Wisconsin, and West Virginia. There are extensive quarries in Nova Scotia and Alberta, Canada.

The color of sandstone varies from light gray or white to dark brown. Varieties in which silica forms the cement have a glassy appearance, and in some localities, this stone is quarried for use in the manufacture of glass. Some sandstones are soft when taken from the quarry, but harden on exposure to the air. The fine-grained varieties are used in making grindstones and whetstones. Among the best-known kinds of sandstones are the *Berea* of Ohio, the *Triassic brownstone* of the Connecticut Valley, the *Potsdam sandstone* of New York, and the *Old Red Sandstone* of Great Britain.

While sandstone has been considered a desirable building stone, because it is durable and easily worked, it has not been regarded as sufficiently strong for massive structures. The United States Bureau of Standards has found by exhaustive tests that when sandstone is treated with melted sulphur and allowed to cool, its crushing strength is increased 200 to 300 per cent. Sandstones which are porous are not nearly so good as those that are compact, since any water which enters expands on freezing, and causes a breaking off of small fragments, thus wearing away the stone.

Related Subjects. The reader is referred in these volumes to the following articles:

Building Stone Geology

Metamorphism Sedimentary Rocks

SANDUSKY, OHIO. See OHIO (back of map). SANDWICH ISLANDS, former name of the Hawaiian archipelago, was bestowed upon it by the famous explorer, Captain James Cook, who named the islands in honor of Lord Sandwich of England. Cook was later slain in a quarrel with the Hawaiians. See Hawaii; Cook, James. SANDY HOOK, a low, sandy spit of land

that stretches out in a northwesterly direction from the coast of New Tersev into Lower New York Bay, with Sandy Hook Bay to the west, and the Atlantic Ocean to the east. It is about eighteen miles south of Manhattan Island, runs about six miles northward from the mainland, and is less than a mile in greatest width. Its northern extremity is guarded by a beacon light; about one mile south of this, there is a lighthouse ninety feet high, the first light seen by incoming boats. A life-saving station is also located here. Fort Hancock is situated at the outermost point of the peninsula, a portion of which is also used by the United States government as a testing ground for heavy ordnance and its effect on steel armor plate.

SAN FERNANDO, fur nan' doh. See Cali-FORNIA (Religion).

SANFORD, ME. See MAINE (back of map).



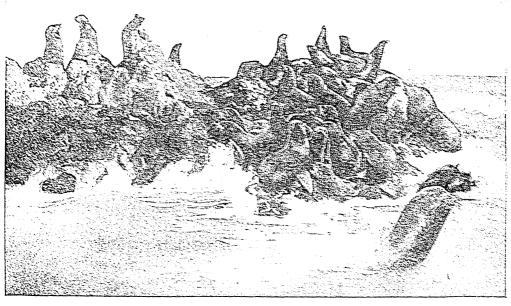
AN FRANCISCO, CALIF. From its site on a hilly peninsula, this great Pacific seaport looks out upon a broad sweep of water on three sides. On the west is the Pacific Ocean; on the east, San Francisco Bay; and joining the two, on the northwest, is a beautiful landlocked harbor—the Golden Gate—a broad gap in the coastal mountains. For beauty of natural setting, few cities can vie with this "city loved around the world." Viscount Bryce, former British ambassador to the United States, once said that, in Europe, only Constanti-nople and Gibraltar combine "an equally perfect landscape with what may be called an equally imperial position." Its harbor is even larger than that of New York City.

Second in size among California's cities, San Francisco is first in rank among Pacific-coast

cities in value of imports and exports, and first in volume of business as measured by wholesale trade. It is 907 miles south of Seattle by rail, and 468 miles northwest of Los Angeles. San Francisco is 1,360 miles west of Denver, 2,271 west of Chicago, and 3,180 west of New York. Population in 1940 was 634,536, a

decrease of 0.8 per cent since 1930.

General Description. Extending about six miles long and seven miles wide on the toe of the boot-shaped peninsula, San Francisco covers an area of about forty-four square miles. It is coextensive with the county of San Francisco. San Francisco Bay, including its northern extension, San Pablo Bay, is fifty-five miles long and three to twelve miles wide. It is the largest bay on the western coast of the United States, and one of the greatest harbors



THE SEAL ROCKS AT SAN FRANCISCO

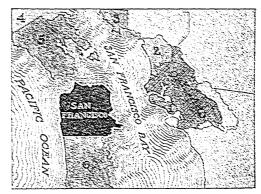
in the world. On the eastern shore, and opposite San Francisco, are Oakland, Alameda, Berkeley, and Richmond, all connected with the larger city by the San Francisco-Oakland Bay Bridge. In the distance, may be seen Mount Tamalpais and Mount Diablo.

With its alternating hills and valleys, the city has a diversity of surface that adds greatly to its charm. The low, level land along the bay shore has been reclaimed by filling in, and is occupied by docks and warehouses and the great Ferry Building—a disembarking point for all railroad passengers from the north and east. Market Street, the main retail business artery of the city, stretches diagonally across the peninsula from the Ferry Building to the base of Twin Peaks, a height of land which has been tunneled to provide rapid transit to the residential sections farther west. mountain is not the western boundary of the city, but practically marks the geographical center. Market Street, which is a second New York Broadway at night, is a handsome thoroughfare, from which the city's other important arteries radiate.

Near the heart of the downtown section—the junction formed by Stockton and Geary streets—or Union Square—is a shopping district, hotels, theaters, and restaurants. An interesting feature of downtown San Francisco is Lotta's Fountain, which Lotta Crabtree, who began her stage career in Calliornia, presented to the city. Near by is the Federal Reserve Bank, the headquarters of the Twelfth Federal Reserve District. About haliway between the Ferry Building and Twin Peaks, beginning at the inter-

section of Market Street and Leavenworth Street, is the Civic Center. Here are the City Hall, the Public Library, the Auditorium, and the State Building. The War Memorial, with an Opera House, and the American Legion Museum face the City Hall on Van Ness Avenue. A Methodist church and hotel building is near the Civic Center.

San Francisco has an ocean beach three miles

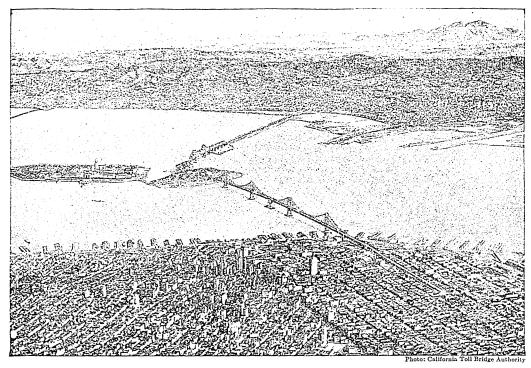


THE METROPOLITAN DISTRICT

- Alameda
 Berkeley
- 4. San Rafael 5. Sausalito
- 3. Richmond
- o. San Mateo County

long, on its western boundary. The Esplanade, faced by recreation pavilions, the famous Cliff House, Seal Rocks, and other attractions, make the fine stretch of beach one of the most interesting features of the city.

Boulevards and Parks. The Great Highway, following the ocean shore, connects with a fine



SAN FRANCISCO BAY AND THE NEW BRIDGE DEDICATED IN 1936

Upon an aerial photograph of San Francisco Bay, with Oakland in the background, architects for the San Francisco-Oakland Bay Bridge drew into scale a representation of the world's longest bridge over navigable water, eight and one-quarter miles long (nearly four miles over water) connecting Alameda and San Francisco counties. The west half of the bridge is a suspension structure. A double-deck tunnel pierces Yerba Buena Island, and the double-deck bridge continues over a 1,400-foot cantilever span, five through truss spans, and fourteen deck truss spans before it lands in the Oakland shore.

system of drives and boulevards leading to all parts of the city. Of the forty-nine parks and forty-six playgrounds, Golden Gate Park is the finest, and its area of 1,013 acres makes it one of the largest city parks in America. It has a frontage on the Pacific of about half a mile, and extends inland for four miles. Here may be found the beautiful Japanese Tea Garden, the Academy of Sciences, the Steinhart Aquarium, and the De Young Museum. Among the statues and busts in the park are those of Father Junipero Serra, General Grant, Schiller, Goethe, General Pershing, and President Garfield. The park aviary contains many rare and interesting birds, and in the buffalo paddock is one of the finest herds of buffalo in the country.

Lincoln Park, occupying elevated grounds, in the northwestern section of the city, is of interest because of the view it affords of the entrance to the harbor. On the highest point is the Palace of the Legion of Honor, an exact replica of the one in Paris, housing a splendid art collection. This was the gift of Mr. and Mrs. A. B. Spreckels, who offered it as a memorial to the men of San Francisco who took

part in the World War. Lincoln Park is the terminus of the Lincoln Highway, America's great transcontinental trail.

The Presidio. To the north and east of Lincoln Park is the Presidio, covering 1,500 acres bounded on the north by the water of the Golden Gate. This is one of the largest military reservations in the country. The adobe building in which Rezanov, envoy of the czar, courted Señorita Arguello, daughter of the Spanish commandante of the Presidio, is preserved as the Officers' Club. Bret Harte and Gertrude Atherton have both told of this romance. The Panama-Pacific-International Exposition, held in 1915, was located just east of the Presidio, in what is now the Marina.

Market Places. The great markets, in which fruit, fish, vegetables, and various other commodities are handled on a large scale, form one of the distinguishing features of the city.

Foreign Colonies. Among the foreign districts of the city, Chinatown holds the greatest appeal. Leading up from Grand Avenue, on which are located world-famous exclusive shops and stores, Chinatown occupies the section bounded by Kearny and Stockton streets and



In "Chinatown." The fame of this street reaches around the world. It once presented an array of opium dens and gambling houses, but to-day, instead, there are scores of fascinating Chinese shops.

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California and Pacific avenues, an area of ten city blocks, within which practically no whites dwell. Here the customs, rites, and practices of the Chinese residents have full sway, excepting for slight modifications imposed by the United States government. Chinatown was destroyed

by the great fire in 1906, and the old buildings have been replaced by modern structures. The chief interest is in the people, for here one may see China without crossing the ocean. Here, too, may be found a Chinese telephone exchange, with Chinese girls operating the switchboard. Other interesting places include the Latin Quarter reached by Columbus Avenue: the Spanish and Mexican districts, on Powell Street; and the Japanese and Greek settlements.

Public Buildings. The United States Mint, at Mission and Fifth streets, was replaced by a building at Duboce Avenue and Buchanan Street, completed in 1937. More gold has been coined in these mints than in any other mint in the entire country. Other public buildings include the majestic group

of municipal buildings in the Civic Center. San Francisco is renowned as one of the few "skyline" cities of America.

Educational Institutions. Within a short distance from San Francisco are three well-known universities—the University of California at Berkeley (see California), Stanford University (which see) at Palo Alto, and the University of Santa Clara. Stanford University maintains in San Francisco the Medical School and Stanford and Lane hospitals.

In the city, too, are the University of San Francisco, and a number of the professional schools of the University of California. There is also the San Francisco College for women, which offers courses in art. San Francisco's High School of Commerce is one of the units in the city's

in the city's twelve-million-dollar school-building program. One of the state teachers' colleges is located in the city.

Transportation and Commerce. San Francisco is the terminal of the Southern Pacific, the Santa Fe, the Western Pacific, and the Great Northern lines.

The city is a motoring center, having extensive motorbus connections, and its three street-car systems give excellent local service. Most of the street-car fines run to the Ferry Building or San Francisco Bay Interurban Terminal.

Highway traffic across the southern end of San Francisco Bay has been facilitated by the completion of a sevenmile concrete bridge extending from the foot of Third Avenue, in San Mateo, to Mount Eden, on the Alameda side,

near Hayward. This is a toll bridge, and is available for motor traffic.

The San Francisco-Oakland Bay Bridge, a giant structure between San Francisco and Oakland was completed in 1936. The total length of the bridge is eight and one-quarter miles, the longest bridge in the world over navigable water. It is double-decked with six lanes for automobile traffic on the upper deck and three traffic lanes for trucks and stages on the lower deck with two interurban electric-line



TEA GARDEN IN GOLDEN GATE PARK



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THE GOLDEN GATE BRIDGE AT SAN FRANCISCO

Majestic portals of the great single span suspension bridge, the first bridge ever to be flung across a major harbor entrance. The span is 4,200 feet and the towers are 740 feet high. The concrete used in the construction is enough to build 10-foot sidewalks on either side of the highway from Omaha to Chicago; the 100,000 tons of steel would fully load a freight train 20 miles long; and the two 300-inch cables contain enough wire to build a standard wire sence 6 feet high on both sides of a highway from Canada to Mexico, 1,600 miles.

tracks. The bridge extends from Rincon Hill in San Francisco over the West Channel of San Francisco Bay to Yerba Buena Island; thence over the East Channel to Oakland.

Another great project was the construction of a bridge over the Golden Gate. Completed in 1937, this bridge affords direct connection between San Francisco and the Redwood Empire, giving the west coast an unbroken driveway from Seattle to San Diego. The bridge is of the cantilever-suspension type, with capacity for six lines of vehicular traffic, two sidewalks, and provision for artillery transport. The main span is 4.200 feet long.

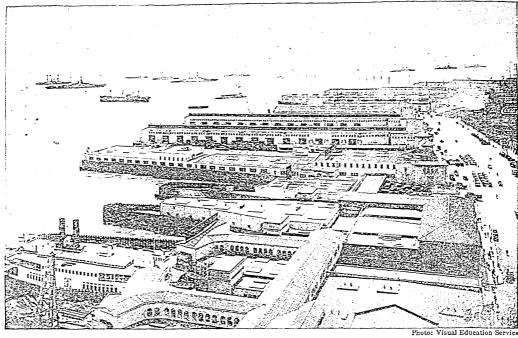
There are regular lines of steamships plying between San Francisco and all the ports of the Orient and the Philippine Islands. Other lines are engaged in coastwise traffic and in South American trade, and the Panama Canal is increasing the ocean traffic between San Francisco and New York and other Atlantic ports, since it has shortened the ocean route between these cities by more than 7,000 miles.

San Francisco Customs District has a large foreign trade, ranking fourth among the fortynine customs districts of the United States, in value of imports and exports. The principal exports include dried and canned iruit, mineral oil, barley, raw cotton, sardines, canned milk, and apples. The city's imports include raw silk, coffee, copra, sugar, newsprint paper, burlap, tea, and coconut oil.

Airports. The United States Army Flying Corps maintains Crissey Field, of the Ninth Corps Area, near the Presidio. Four modern air terminals in the San Francisco Bay area are within thirty minutes of the heart of the city. The San Francisco Airport is twentyfive minutes from the downtown section. San Francisco also contains the terminus of the Pan American-Oriental Flying Boat Service for mail and passengers which operates between the United States and China.

Industries. During World War I, shipbuilding was very important, but now San Francisco's principal industries are printing and publishing, the preparation of coffee and spice, slaughtering and meat packing, the production of bakery goods, the manufacture of motor vehicles, canning and preserving, and the making of furniture, confectionery, and clothing. The food industry affords an outlet for California's agricultural production. Numerous other commodities are also produced.

Water Supply. The Hetch-Hetchy project of bringing water from the Tuolumne River in the Sierra Nevada Mountains, 150 miles away, was begun about 1010, and completed in Octo-



DOCKS AND BAY, WITH BATTLESHIPS AT ANCHOR

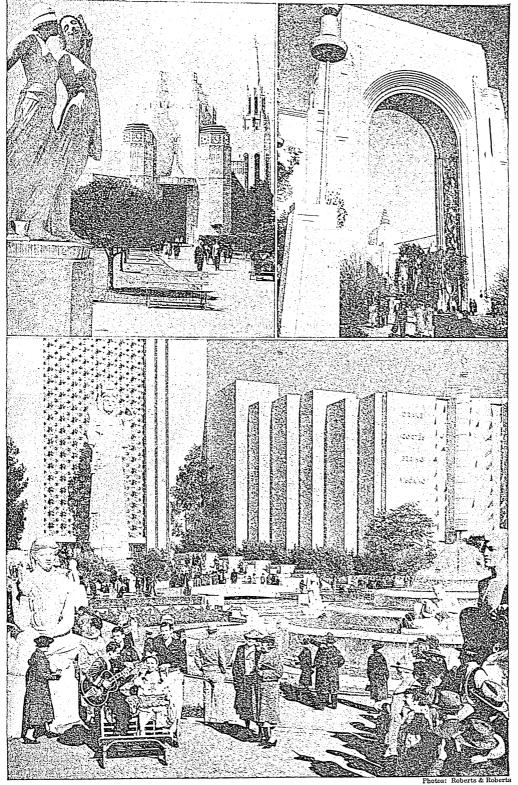
ber, 1934. O'Shaughnessy Dam is capable of impounding 67,000,000,000 gallons of water. At a cost of \$100,000,000 the city has developed one of the greatest water storage and aqueduct systems of America, insuring enough water to supply 4,000,000 people.

History. În 1769 Don Gaspar de Portola, governor of California, and his little band of adventurers were the first to glimpse the bay from the near-by hills. In 1579 Sir Francis Drake passed by the Golden Gate and discovered Drakes Bay a few miles to the north. Six years

however, after the Portola discovery, Don Juan Manuel Ayala sailed the first vessel, the San Carlos, through the Golden Gate. The settlement of San Francisco began with Mission Dolores in 1776, the year of the adoption of the Declaration of Independence. A military post, the Presidio, was established the same year. From its beginning, the mission prospered and increased rapidly in numbers and wealth. In 1834 commercial interests began to control its affairs, and from that date it declined. In 1836 the village of Yerba Buena



SAN FRANCISCO AS IT APPEARED DURING THE GOLD-RUSH PERIOD



Golden Gate International Exposition. Above, left, the statue of "The Moon and The Dawn," by Ettore Cadorin, and the entrance to the Palace of Mines, Metals, and Machinery, and the imposing Tower of the Sun. Above, right, Triumphal Arch. Below, partial view of Court of the Pacific, including eighty-foot statue of that name, against a "prayer curtain" scintillator.

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was established on the bay, about three miles from the mission. From this little business center, San Francisco reached its present size.

In 1848 gold was discovered by James Marshall in the tailrace of Sutter's mill, and almost overnight, San Francisco was transformed from a village into a city. California was admitted to statehood in 1850, and in 1859 the great Comstock Lode in Nevada began pouring a flood of wealth in to San Francisco. In 1869 came the railroad, and the opening of the markets of Japan and China led to the establishment of the foreign trade of the city. In the early years of its existence, San Francisco was burned three times, and again in 1906, but each time was builded a new and greater city. Its World War I Memorial is America's first municipally owned opera house.

In 1939 and 1940, the Golden Gate International Exposition was held on the man-made, 400-acre Treasure Island, north of Yerba Buena Island and between the Golden Gate and San Francisco-Oakland Bay bridges. This great exposition celebrated progress especially in the West and the Pacific Basin. The architecture blended old Mayan, Incan, Malayan, and Cambodian forms, finished in iridescent stucco, with the Court of Honor and the Tower of the Sun, the courts of the Seven Seas, Pacifica, Flowers, Reflections, and the Moon, as chief attractions, each with individual color schemes, but unified by flowing color changes. R.B.K.

SAN FRANCISCO DE ASIS. See CALI-

FORNIA (Religion).

SAN FRANCISCO PEAK. See Arizona

(The Land and Rivers).

SAN FRANCISCO SOLANO. See Cali-FORNIA (Religion).

SAN GABRIEL. See California (Religion). SANGAI, sahN gi', OR SANGAY, an Andean peak. See South America; also, page 4694.

SANGER, MARGARET (1883-), a pioneer in the birth-control movement, and organizer of the American Birth Control League, of which she is president. In defense of her ideas, she faced misunderstanding, active opposition, ridicule, and even legal restrictions. Indicted for misuse of the mails, in 1915, Mrs. Sanger escaped trial only through the influence of President Wilson. Again, in 1916, she was arrested for conducting a clinic in Brownsville, N. Y., and in 1929 for conducting one in New York City. The result of the Brownsville incident was that physicians in New York were given permission to advise patients about birth control for purposes of "cure and prevention of disease." Mrs. Sanger established birthcontrol leagues in Japan and China while on a trip around the world, in 1922, and organized the first World Population Conference, held in Geneva, Switzerland, in 1927.

A professional background has been of great

advantage to Mrs. Sanger in her work. She received a nurse's training at the school in the White Plains Hospital, and took postgraduate work in a hospital in New York City. Her early life was spent in Corning, N. Y., where she was born. She has published a number of books on subjects connected with her work.

SANGSTER, CHARLES (1822-1893), one of the first of the Canadian poets, and one who is credited with a considerable part of the national sentiment which resulted in Confederation. Beginning about 1860, when political conditions in the Canadas were at the worst, Sangster wrote many verses in which patriotism has a strong, if not always predominant, note. He was born at Kingston, Ont. In his youth he was a newspaper editor at Amherstburg, and later was in newspaper work at Kingston, but in 1868 he received an appointment in the Postoffice Department. See CANADIAN LITERATURE (English Canada).

Volumes of Poems. His poems were collected in two volumes, The Saint Lawrence and the Saguenay, and Other Poems, and Hesperus and Other Poems and Lyrics.

SANHEDRIN, san he' drin, also called SAN-HEDRIM, the supreme national council of the Jews, with authority over religious, civil, and criminal cases. It was established at the time of the Maccabees (which see). At the time of Christ, it was made up of seventy-one members; they were presided over by the high priests, and met daily near the Temple in Jerusalem. The members were chosen from different classes of society, eminent learning being the sole requisite for admission. Minor courts were set up all over the country by the Sanhedrin. Jesus was tried before the Sanhedrin as a false prophet, and Peter, John, Stephen, and Paul appeared before it on charges of religious error. After the fall of Jerusalem, in A.D. 70, the Sanhedrin declined in power, and finally disappeared. Gamaliel, Paul's teacher, was a member of the Sanhedrin. See GAMALIEL.

SANITARIUM (plural, sanitariums or sanitaria), a health station, or retreat for the conservation of health. The term, derived from the Latin sanitas, meaning health, is sometimes used as a variant or equivalent of sanatorium, but is usually applied to an establishment where the conditions and treatment are prophylactic, that is, designed to prevent disease.

The term sanatorium is usually applied to an establishment for the treatment of the sick, especially one that employs some specific treatment or treats specific diseases. In English usage, especially, a sanatorium is a health resort, or locality of favorable climate, such as a high-altitude summer station in a tropical country, like Darjeeling in India. In this sense, sanitarium and sanatorium are interchangeable.

SANITARY SCIENCE. The purpose of sanitary science is to raise health standards,

check disease, and prolong live—in general, to make the world a safer and better place. Centuries ago, epidemics of smallpox, cholera, the plague, and similar diseases swept over countries and reaped harvests of countless victims, because sanitation, the great foe of these enemies, was not understood. Sanitary science has to do with the ground on which houses are built, methods of ventilation, water supply, sewerage and drainage systems, quarantine, vaccination, and other measures for preventing disease or checking its spread, and with the personal habits of the individual.

Related Subjects. The reader is referred to:

Adulteration of Food-Health Habits stuffs and Clothing Heating and Ventilation Antiseptic Hygiene Aqueduct Inoculation Baths and Bathing Life Extension Board of Health Mosquito Epidemic Ouarantine Filter Reservoir Fly Serum Therapy Food Sewage and Sewerage Fumigation Vaccination Habit Waterworks Well Boring

SAN JACINTO, jah sin' toh, the final and decisive battle of the war for Texan independence, fought on the afternoon of April 21, 1836. near San Jacinto Bay, Tex. Santa Anna commanded a Mexican force of about 4,000, and the Texans, numbering about 740, were led by General Sam Houston (which see). The Texans rushed to battle with the cry, "Remember the Alamo," and speedily won a complete victory. Over 1,300 Mexicans were killed, captured, or wounded, and Santa Anna was taken prisoner the following day. The Texan loss in killed and wounded was about thirty. See Texas (History); Alamo; San Antonio, Tex.

SAN JACINTO, Mount, a peak 10,300 feet

high in southern California.

SAN JOAQUIN, wah keen', RIVER, an important waterway of California, which has its source in a small glacier on the eastern slope of the Sierra Nevada Mountains of Tulare County. It flows southwestward, then in a northwesterly direction, traversing the fertile San Joaquin Valley, and meets the Sacramento River (which see) in the marshy flood plain at the head of Suisun Bay. Its length is about 350 miles, 125 miles of which are in the mountains, and it is navigable throughout the year as far as Stockton, a distance of fifty miles. The valley of the San Joaquin is frequently called the "granary of California." See California (Rivers, Lakes, and Waterfalls).

SAN JOSE, sahn ho sa', capital of Costa

Rica. See COSTA RICA (Cities).

SAN JOSE, CALIF., the county seat of Santa Clara County, the largest canning and dried fruit center of the world, is located near the southern end of San Francisco Bay, fifty

miles from San Francisco. San Jose was California's first state capital, and the first state legislature convened here in 1840. In March, 1850, it became the first incorporated city of California. Population, 68,457 (1940). See CALIFORNIA (Religion).

SAN JOSE SCALE, the most destructive of the scale insects, commonly found on shrubs and fruit trees throughout the United States and Canada. The pest takes its name from that of the city in California in which it was discovered, in 1880. It was believed to have been introduced on trees brought from China. The insect was not found east of the Rocky Mountains until 1893, but by 1895 it had become widespread. The San Jose scale is difficult to fight, because of its minute size and its amazingly rapid reproduction. The largest insects are not larger than the head of a pin. and it has been estimated that one female scale may produce over 3.216.080,000 young insects a year. The branches of infected trees are literally powdered with their minute bodies, and, as they exude a gray scaly wax, the

Photo: Visual Education Service

SAN JOSE SCALE

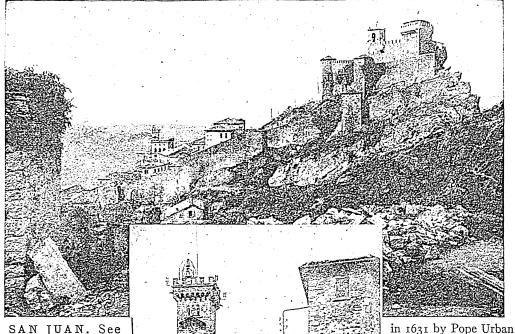
plants look as if coated with ashes. Like other scale insects, the San Jose scale sucks the sap of the host plant.

The danger of the pest is increased by the great number of its food plants, which include orchard and small fruits, the members of the rose family, the pecan, the English walnut, the elm, and other trees. The fruits of infected apple and pear trees show a reddish discoloration of the skin and are often rough, pitted, and distorted in shape, or cracked. A full-grown apple tree may resist these insects for several years, but a young peach tree is often killed in two seasons.

The pest is spread by infected nursery stock; the scales are scattered by the wind, and are carried on the feet of birds and flying insects. The Chinese ladybird beetle is a natural enemy of the pest, and the chalcidid fly destroys the adult scales. A mixture of lime and sulphur, and certain sprays containing oil, are standard remedies in the Eastern United States. See SCALE INSECT. W.J.S.

Scientific Name. The scientific name of the San Jose scale is Aspidiotus perniciosus.

SAN JUAN, sahn hwahn, the capital city of Puerto Rico. See Porto Rico.



SAN JUAN. See CALIFORNIA (Religion). SAN JUAN BAU-TISTA, sahn hwahn bou-

tees' tah, the name given by Christopher Columbus to Porto Rico. See Porto Rico (History).

SAN JUAN CAPI-STRANO, kah pe strah'-See CALIFORNIA (Religion).

SAN JUAN IS-LANDS, an archipelago between the state of Washington and Vancouver Island. They were awarded to the United States by arbitration in 1872.

SAN JUAN RIVER. See Utah (Rivers).

(1840-1908), a gospel singer and hymn writer,

friend of Dwight L. Moody (which see).

SAN LUIS, sahn loo ees'. See California

SAN LUIS OBISPO DE TOLOSA, sahn looees' o bis' po da to lo' sah. See California (Religion).

SAN LUIS POTOSI, sahn loo ees' po toh se'. See Mexico (Leading Mexican Cities).

SAN MARINO, sahn mah re' no, one of the smallest republics in the world, claims to be the oldest republican state in Europe. It was formally acknowledged an independent state

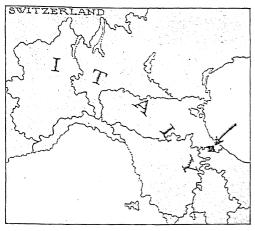
IN THE TINY REPUBLIC OF SAN MARINO

In the upper illustration, an old castle overlooks the SANKEY, IRADAVID quarries. The inset shows almost the only level spot in the city of San Marino; the government palace stands behind a statue of *Liberty*.

San Marino is VIII. situated in a mountainous district of Northeastern Italy, about twelve miles southwest of the port of Rimini, on the Adriatic Sea. It has an area of about thirty-eight square miles, and a population of 14,545. It is said a cannon in the capital cannot be used to salute distinguished visitors, for fear of disturbing the peace of its neighbor state. The chief occupations of the people are the raising of cattle and the making of wine. Stone is exported. The little republic issues its own postage stamps and coins.

The legislative assembly of the republic is a Great Council of sixty members, elected by popular vote. Every six months, two executive officers, called Regents, are selected from the Council members, and a smaller executive council of twelve members is chosen from their number every year. A treaty of friendship, negotiated with Italy in 1907, was renewed in 1914, and San Marino followed Italy in declaring war against Germany in World War I, and in September, 1940, joined Italy against Great Britain in World War II.

The capital, also known as San Marino, is situated at the summit of Monte Titano, about 2,650 feet above the sea. It has been in existence since the fourth century, and is a small, old-fashioned town, whose streets, paved with



SAN MARINO

The small black area in the east marks the location of the little republic.

flagstones, are so narrow and crooked that vehicles of any kind are used but little. The buildings, as well as the customs, of the town have remained almost unchanged since medieval times. In the public square, the social center of the town, are great cisterns filled with rain water, the only source of water supply.

Related Subjects. The reader may find interest in reading about the other miniature states of the world. See the articles:

Andorra Liechtenstein Monaco Vatican City

SAN MARTIN, sahn mahr teen', José de (1778-1850), a distinguished general and champion of South American independence, one of the most prominent figures in the wars which freed the countries of South America from the power of Spain. He was born in Argentina, but educated in Spain, where he had his first taste of military service in a war with France. On hearing that the Spanish colonies in South America had rebelled, he hurried to Buenos Aires, and was given command of a large division of the patriot forces. In Chile he scored two brilliant victories over the Spanish army, which brought about Chilean independence.

Later, San Martin helped the Peruvians to win their liberty, and in 1821 he was made Protector of Peru. He used his authority to accomplish some important reforms, both educational and political; but in the following year, although the idol of the people, he gave up the dictatorship to Simon Bolivar (which see), and left secretly for Europe. He later revisited his native country, to find the republics warring among themselves, and he immedi-

ately returned to France. There he lived quietly and almost in poverty until his death.

SAN MIGUEL, san me gel'. See Califor-NIA (Religion).

SAN PABLO BAY. See SAN FRANCISCO.

SAN RAFAEL, rah fel'. See California (back of map).

SAN SALVADOR, sahn sahl vah dohr', capital city of Salvador (which see).

SAN SALVADOR ISLAND, OR WATLING ISLAND. See BAHAMA ISLANDS.

SANSKRIT LANGUAGE AND LITERA-TURE. Sanskrit is the ancient sacred and literary language of India. It is divided into two periods-Old Sanskrit, called Vedic Sanskrit, or, more properly, Vedic, in which the *Vedas* were written, and classical Sanskrit, the literary remains of which are chiefly on subjects other than religious. The time of the introduction of Sanskrit into India cannot be even approximately known, but 1500 B.C. is the date generally assigned. For a period, uncertain in its length, it was the common speech of the people, as well as the literary language, but by the third century B.C., several local dialects were in use. As early as the sixth century B.C., Buddha used a local dialect to preach his doctrine. The literary idiom ceased to be understood by the common people, and in this more or less artificial and classical form, it exists to-day.

Its Position of Importance. Sanskrit may not be dismissed with a careless word, simply because it has no present vital existence. Since it came to the knowledge of Europeans, in the latter half of the eighteenth century, it has exercised a profound influence on the

व काको वृक्षे वसतः ≥ हेवो वदित ० किमर्थिम्पतरम्पुचो न समरित

SPECIMEN OF SANSKRIT

Translation: (a) Two crows dwell in the tree; (b) The god speaks; (c) Why does the son not remember the father?

scholarship of the world. Comparative philology, comparative mythology, and comparative religion are the direct outgrowth of its study. For Sanskrit, by the very fact that it has survived through so many centuries as a merely formal speech, has not been subject to the constant changes which creep into the common speech of a people, and, consequently, preserves in purer form than any other of the Indo-European languages the characteristics of the common stock from which these all sprang. The real understanding of the development of such important languages as Greek, Latin, English, and German has been made possible, therefore, largely by the possession of Sanskrit as a means of comparison.

Developed a Great Literature. Interest in Sanskrit is not due entirely to its linguistic value, for it possesses a literature well worthy of study for its own sake. In a wider sense, this literature includes the Vedas, the sacred Hindu books which constitute the oldest work in any Indo-European language. Sanskrit literature proper, as distinguished from the Vedic, is entirely secular, as stated above, and its greatest monuments are the epics known as the Ramayana and the Mahabharata. Other epics less noteworthy than these exist, together with lyric and didactic poetry, narratives, and even dramas. Though the Hindus claim a great antiquity for their drama, there seems no real reason for placing its beginnings before the fifth or sixth century of the Christian Era. Nor is it possible to state that it was entirely a product of that country, many scholars seeing in it distinct traces of Greek influence. In general, the themes are taken from Hindu legend or history, and the characters are types rather than individuals.

Most interesting of all to students, however, are the beast fables and fairy tales, for in these is evident a very close connection with such narratives in European languages. India seems to have been one of the earliest homes of the fable, and practically every fable *motif* which is found in European fables exists in some form in Sanskrit literature. Many of these Hindu tales are built on the story-within-story plan which the *Arabian Nights* has made familiar. Some of the stories of that famous book may be traced to their source in the tales of India, and many of the legends and tales of medieval Europe are of the same origin. See Fable.

SAN STEFANO, sahn sta' fah no, Treaty of. See Berlin, Congress of; Russo-Turkish Wars (Nineteenth Century); Russia (History); Bulgaria (History).

SANTA ANA, san' tah an' ah, CALIF. See CALIFORNIA (back of map).

SANTA ANA MOUNTAINS. See CALIFORNIA (Surface Features).

SANTA ANNA, salm' tah ah' nah, Antonio Lopez de (1705-1876), Mexican soldier, statesman, and opportunist extraordinary. He was several times President and later made himself Dictator of Mexico. He was thoroughly unscrupulous, guilty of treasons and betrayals, and during the early years of the Mexican republic his activities kept the country in turmoil and gave it an unsavory reputation among the nations of the civilized world.

Santa Anna was born in Jalapa, in the province of Veracruz. He began his long career at the age of fifteen when, as a cadet, he entered the Spanish colonial army quartered in Mexico and fought againt the insurgents in the War of Independence. Toward the end of the struggle he deserted the Spanish cause, joined forces with Iturbide, and helped to make him

Emperor. Within less than a year, however, provoked because Iturbide had refused to give him the governorship of Veracruz, he led a revolt against the Emperor which led to the latter's abdication. Santa Anna then

supported the liberal leader, Guerrero.

In 1829, as commander in chief of the Mexican forces, he defeated the Spanish army which was making a belated attempt to restore the power of Spain in Mexico. Encouraged by his military successes, Santa Annalooked upon himself as the "Napoleon of the West." He backed the political aspirations of Bustamente, succeeded in making him President, but quickly turned



SANTA ANNA

[The name is sometimes spelled Santa Ana.]

against him. On November 12, 1832, he defeated Bustamente in the battle of Casas Blancas.

The following year Santa Anna became President. He had little regard for the federal constitution and ruled with a high hand. In 1835, Texas revolted from Mexico and established its own government. Santa Anna hastened to put down the revolt, attacked San Antonio, and captured the Alamo (which see) in March, 1836. The Mexican army was defeated at the San Jacinto River by General Sam Houston. Santa Anna was captured but General Houston saved the Mexican President from immediate execution. He was permitted to return to his own country.

In 1838, Santa Anna lost his leg in battle when he prevented the French from landing in the port of Veracruz. He was again President from 1841 to 1844, when he was ousted during a revolution and forced into exile in Jamaica. When war with the United States broke out in 1846, he returned and headed the Mexican army. After the occupation of Mexico City

by General Scott he resigned.

Santa Anna, by this time, was closely associated with the forces of reaction. In 1853, he seized the reins of government and proclaimed himself Supreme Dictator. Within two years he was overthrown and again exiled, this time to Cuba. He tried to re-enter the country during the French invasion of Mexico, in 1864, but was prevented. After the death of Júarez, Santa Anna returned, and died in poverty in Mexico City.

SANTA BARBARA, CALIF. See CALIFORNIA (Religion; and back of map).

SANTA CATALINA, kat ah le' nah. See CATALINA ISLAND. SANTA CLARA DE ASIS. See CALIFORNIA (Religion).

SANTA CLAUS, a more frolicsome, but no less kindly, person than his ancient ancestor, Saint Nicholas. Pious Saint Nicholas, as the youngest bishop in the history of the church, assumed the legendary role of patron saint of

schoolboys. European schoolboys of medieval times celebrated the feast of Saint Nicholas on December 6 by electing a boy bishop. Dressed in magnificent robes, the boy bishop led a mock solemn procession which wound through the narrow streets, and sometimes took possession of the churches. There was much feasting, but, on the whole, the occasion was solemn and sedate. Although originating in a mere childish love of pranks, and entirely innocent, the custom was abolished. But Nicholas remained the saint of children, and in Belgium and Holland his feast day is still celebrated by young and old, with charming local variations. The grave, venerable saint. in full episcopal robes and miter and

carrying a pastoral staff, rides a white donkey. If Hans and Katrina have been good children, gifts are deposited in their shining wooden shoes, but if they have been bad, a bundle of switches is left as an admonition. Though kindly, Saint Nicholas is a highly moral saint, and even his little white donkey must disdainfully refuse the carrots laid out for him by bad children.

Protestantism sternly frowned upon worship of saints, but custom and amusement prevailed, and Saint Nicholas' festival became assimilated in Christmas festivities. Our Dutch

ancestors brought with them to New Amsterdam the customs of the homeland; forlorn and lonely English colonists eagerly borrowed the legend and festivity surrounding the kindly Saint Nicholas. The Dutch words San Nicolaas, when said rather fast by excited children, became Santy, or Santa, Claus.

Only American childrensav Santa Claus, and even in America, during the first half of the last century, the saint was still known as Saint Nicholas or Saint Nick. In 1822, Clement C. Moore wrote A Visit from St. Nicholas for his children. In that famous poem, beginning, "'Twas the night before Christmas, when all through the house," the name Santa Claus does not appear. But the grave saint has become a jolly gnome with "eyes-how they twinkled!" and "his dimples how merry!" The poet described his rosv cheeks, his nose, "like a cherry," and his snowy beard. The merry fellow shows the friendliest spirit when caught in the act of descending the chimney. Moore vividly presented jolly Saint Nick, thus:



SANTA CLAUS

He had a broad little face and a little round belly That shook when he laughed, like a bowlful of jelly. He was chubby and plump, a right jolly old elf, And I laughed when I saw him, in spite of myself.

The saint also acquired reindeer after his arrival in America. No reindeer had pawed the thatched roofs of Germany or Holland. The belief must have come from Scandinavia where the reindeer has been domesticated from time immemorial.

The career of Santa Claus through the ages is as mysterious as his annual flight. In some parts of Germany, he disappeared entirely, but

the customs long associated with him remained, and the giver of gifts became the Christ Child, in popular German, Kris Kringle, who, in America, became identified with Santa Claus.

Instead of going directly from Holland to England, Santa Claus went by way of the American colonies. He has never had the whole-hearted allegiance of the mother country. Many English children believe that Father Christmas, a gentleman in a sort of eighteenthcentury costume, with gaitered legs, a tail coat, and a squarish beaver hat, leaves gifts. See NICHOLAS, SAINT; CHRISTMAS.

SANTA CRUZ, BATTLE OF. See NELSON,

SANTA CRUZ, CALIF. See CALIFORNIA (Religion and back of map).

SANTA FÉ, sahn' tah fa'. See Argentina

(Cities).

SANTA FE, N. M., state capital and county seat of Santa Fe County, was founded about 1610 by Governor Pedro Peralta. Even today a Spanish atmosphere remains, and is one of the chief attractions, especially for tourists.

Indian and Mexican arts and handcrafts, painting and sculpture, and hand weaving of woolen textiles are carried on. The New Mexico School for the Deaf and Dumb, the United States Industrial School for Indians, and the School of American Research are located in Santa Fe. Population, 20,325 (1940).

SANTA FE TRAIL. See TRAILS OF EARLY

SANTA INÉS, sahn' tah e' nase. See CALI-FORNIA (Religion).

SANTA MARTA PEAK. See ANDES.

SANTA MONICA, CALIF. See Los An-GELES (Parks, Homes, and Resorts).

SANTA, OR SAINT, SOPHIA, so fe'ah, a Christian church, a Mohammedan mosque, and a Turkish museum in turn during the centuries of its existence. Always it has remained one of the glories of Byzantine architecture. The present structure was erected as a Christian church by the Roman Emperor Justinian the Great, who brought it to completion in 538. The building is a rectangle with a disappointing exterior, but its beautiful interior makes it architecturally one of the wonders of the world.

The interior, 250 feet from east to west and 235 feet from north to south, is divided by two piers and eight columns into a nave and aisles. Over the center of this great hall of worship rises the most impressive feature and crowning glory of the structure—the dome. This is 180 feet high and 107 feet in diameter, and is supported on four arches, each having a span of nearly 100 feet. The arches rest upon eight porphyry columns arranged in pairs at the four corners of the nave. In the base of the dome are forty-six arched windows, through which the edifice is lighted. From the cornice of the dome a half dome extends east and west, and

this in turn rests on three smaller and lower half domes which extend to the entrance.

The builders searched the whole Roman Empire to find columns, alabasters, and precious ornaments. The walls are lined with marbles of various hues, in beautiful designs. The vaulting is set with glass mosaic of finest On the capitals Byzantine workmanship. of many of the columns are monograms of Tustinian and the Empress Theodora.

In 1453 the Turks captured Constantinople. and converted the Church of Santa Sophia into a Mohammedan mosque, erecting minarets at the four corners and destroying all Christian emblems. At the close of the World War, the Greeks hoped to reclaim the edifice for their national Church, but Turkey's subsequent victories left the stately building a mosque, called Mehmedie Mosque by many

Mohammedans.

In 1933, the Byzantine Institute of America co-operating with the Turkish government began the work of restoring the mosaics, which had been concealed during five centuries. The restoration revealed innumerable Christian symbols including a figure of Christ seated upon a jewelled throne, the angel Gabriel, and many jewelled crosses. See Turkey; Constant-INOPLE; illustrations on pages 363; 4381.

SANTAYANA, GEORGE (1863philosopher, and author, was born in Madrid. When nine years old he was taken to Boston for his education, and was graduated from Harvard in 1886. Following two years' study in Berlin he taught philosophy at Harvard from 1880 to 1912. He spent four years in England, and then went to live in Rome. The best known of his numerous works include The Sense of Beauty, Soliloquies in England, The Last Puritan, Obiter Scripta, and The Realm of Truth.

SANTEÉ, san te', RIVER. See SOUTH CAR-OLINA (Rivers).

SANTIAGO, sahn te ah' go, the largest city of Chile, the capital of the republic and also of the province of Santiago, is picturesquely situated in a valley between the Andes and the Chilean coast range, sixty-eight miles south-east of Valparaiso. Though the city lies in an arid region, irrigation makes possible the lux-uriant growth of trees and flowers, and the maintenance of several large parks. The city is one of the most beautiful in South America, and one of the oldest, having been founded in 1541. There are broad, well-paved streets, and the newer buildings compare favorably with those of other large cities of the Western world.

Among the conspicuous structures are the mint, the Hall of Congress, an opera house, a cathedral, and the buildings of the University of Chile, founded in 1743. Other educational institutions include the National Library, the National Museum, a botanical garden, ar

observatory, and professional schools.

The city has boot-and-shoe factories, flour mills, breweries, and tanneries. Its population of 1,111,047 (estimated, 1937) makes it one of the largest cities on the Pacific coast. The city suffered severely from a great earthquake in 1006. See CHILE.

SANTIAGO, largest of the Cape Verde Islands (which see).

SANTIAGO, BATTLE OF. See Spanish-AMERICAN WAR.

SANTIAGO DE CUBA. See CUBA (Principal Cities).

SANTIAGO DE GUATEMALA. See Gua-

TEMALA (The Cities).

SANTO DOMINGO, sahn' toh doh ming' go (now officially designated as the DOMINICAN REPUBLIC), is the eastern and larger of the two republics on Hispaniola (official name of the island of Haiti, which see). This island was one of the first claimed by Spain, following its discovery by Columbus. The republic of Haiti, Santo Domingo's island neighbor, occupies but one third of the island. Santo Domingo has an area estimated as 19,332 square miles, which is slightly greater than the combined area of New Hampshire and Vermont; the population is

1,616,561 (1938 estimate).

The general characteristics of the country are like those of Haiti (which see). The climate is tropical, the rainfall plentiful, and the soil rich, especially in the many valleys. The people are mainly a mixed race of European, African, and Indian blood, but there are, in addition, a number of Spanish Creoles, with a small percentage of the inhabitants of the cities speaking English and French. Spanish is the predominant language. The Roman Catholic is the prevailing religion, but there is absolute religious freedom. Primary instruction, free and nominally compulsory, has in recent years been extended throughout the republic, and the state maintains a Central University in the city of Santo Domingo, and several technical, normal, and high schools.

Resources and Trade. Agriculture, which is of a tropical nature, is the main source of wealth to the republic. Sugar, cacao, tobacco, coffee, and cotton are the principal products and exports. Trade in cereals with Cuba and Porto Rico is increasing steadily. The mountain slopes provide suitable grazing for cattle, and the large tracts of forest afford tropical timber for export. Copper, gold, silver, manganese, iron, and rock salt are the chief minerals, but, for the most part, are little worked, because of the inaccessibility of the central Cordillera, where they are most abundant. Almost every mineral may be found somewhere in the republic.

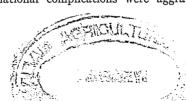
Customs duties are one of the chief sources of revenue, but the internal revenues have increased until they have exceeded the customs duties. The United States gold dollar is the monetary standard, and nearly three fifths of the trade is with the United States.

The principal imports are cotton goods, iron and steel manufactures, machinery, clothing, and motor cars. Interior facilities for communication and transportation are as yet inadequate, but there are more than 845 miles of important highway, and railway construction is being pushed rapidly. There are about 147 miles of railroad in operation, besides 255 miles of plantation lines.

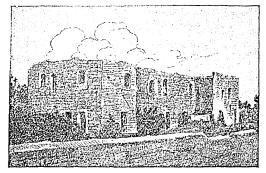
Government and History. The Dominican Republic is governed under a Constitution adopted in 1844, which has been several times revised, the last time in 1934. The legislative power is vested in a Congress of two houses. The upper chamber, or Senate, has twelve members, one for each province, and the lower, or Chamber of Deputies, thirty-three members, one for each 30,000 inhabitants or fraction Senators and Deputies are elected thereof. by direct popular vote for four years. The executive power is vested in a President, elected by direct popular vote for a term of four years, and a Cabinet composed of the President and seven Secretaries of State, each one of whom heads a department. Each of the provinces is administered by a governor, who is also elected by direct vote.

The early history of Santo Domingo was one with that of Haiti (which see). The Spanish inhabitants of the island declared their independence from Spain in 1821, with hopes of becoming a part of the state of Greater Colombia and enjoying the protection and help of Simon Bolivar. Colombia was not able to offer assistance, and the President of Haiti extended his control over the entire island. In 1844 the people revolted against the Haitian government, and the Dominican Republic was proclaimed. Constant fear of foreign invasion caused the Santo Dominicans to seek the aid of Spain, and in 1861 the republic was formally annexed to that country. This arrangement also proved unsatisfactory, and two years later, there was a revolution which restored the Dominican Republic. In 1865 Spain renounced all claim to the country, and recognized its independence. From 1868 to 1870, there was considerable agitation in the republic for annexation to the United States. Its isolated position and constant quarrels with its neighbor, Haiti, as well as the expected financial aid to economic development, made such a union a desirable prospect. President Grant supported it in his message to Congress in 1870, but Congress did not think well of it.

The period that followed was one of revolution, constitutional changes according to the whim of the numerous military Presidents, merciless terrorism, and lawless dictators, until the resources of the country were dissipated, and international complications were aggra-



vated by reckless debts contracted for no legitimate purposes. Defaulting of payments to foreign creditors caused several European governments to threaten forcible collection of the debts. The Dominican citizens of the better class were anxious for help from the United States, which in turn recognized the impending danger of a European power in possession of this tiny republic, and a consequent violation of the Monroe Doctrine. John Hay, Secretary of State for the United States, proposed a treaty which stipulated that the United



HOUSE OF COLUMBUS

Ruins of a house built in 1509 by Diego Columbus, son of Christopher Columbus, in Santo Domingo. It is the oldest structure in the western hemisphere erected by white men.

States should administer the customs, provide for the retirement of legitimate debts, and protect the republic from the unjust claims. Congress interpreted certain phrases to mean the establishment of a protectorate, and refused to pass the act, but President Roosevelt took the matter in hand, issued a modus vivendi early in 1905, and appointed an agent of the United States to administer the customhouses. A treaty signed in 1907 was practically a congressional sanction of Roosevelt's policy.

To hope for absolute political serenity would have been vain. Disturbances of various kinds arose, and debts, due to military expenses mainly, were incurred without the knowledge of the United States. Serious revolts were quelled by American intervention in 1913, and another uprising was put down in 1915. prevent civil war, United States marines were dispatched again, in the spring of 1916, to various parts of the republic, and in November a military government was proclaimed by the commander of the American marines at the capital. For the following four years, there was civil peace, order, and economic improvement.

In June, 1917, Santo Domingo severed diplomatic relations with Germany, and proclaimed that its sympathies were with the United States in the World War. When a provisional President was installed in office, in 1922, to reëstablish the Dominican Constitution, the United

States made plans to withdraw military government, but continued on duty to assist the provisional government. The inauguration of the constitutional President on July 12, 1924, marked the end of the United States military government in Santo Domingo.

The period of American intervention was marked by many improvements, among which were the extension of educational facilities, the improvement of highways, and the placing of the republic's finances on a stable basis. In 1924 a new convention with the United States to replace that of 1907 was signed, and approved in 1925. In 1929, Charles G. Dawes headed a commission to study Santo Domingo finances and make a budget, later adopted. In 1930 a hurricane killed 4,000 people. The Government declared war on the Axis Powers on December 11, 1941. See WORLD WAR II.

Santo Domingo, officially Ciudad Trujillo (Trujillo City), the capital city, is the oldest existing European settlement in the New World. It was founded in 1496 by Bartholomew Columbus, brother of the illustrious discoverer. The city is a seaport on the southern coast of the island, at the mouth of the Ozama River. The place, even at the present time, is typically Spanish. Many natives dwell in thatchcovered cottages, but the picturesque ruins of great stone mansions tell a story of former grandeur. The streets are straight, but most of them are narrow. One of the most interesting buildings is a large Gothic cathedral, where Columbus and his son Diego were formerly buried (see COLUMBUS, CHRISTOPHER). In the principal city square is a statue of the navigator.

Santo Domingo is important commercially as a center for the export of coffee and sugar. The harbor is not naturally well protected, but it has been improved by the erection, at the entrance, of a jetty and a sea wall. In 1913 a large concrete wharf was constructed. The population is 71,297 A.Mo. (1935).

SANTOS, sahn'tozh, Brazil. See Brazil (Cities).

SANTOS-DU-MONT, sahn' tohs dumawN', ALBERTO (1873-1932), an early leader in the development of the flying masided in Paris. His



In the early days of air navigation, he made his name famous, but he was later eclipsed by the Amerchine, was born at São icans, the Wright Brothers Paulo, Brazil. He reraulo, Brazil. He re-Frenchmen, Bleriot and ceived his education Nieuport. The illustration in France, and after shows him at the age when his father's death re- he was at the height of his fame.

SANTOS-DUMONT

first experiment in flying was made in 1897, in A year later, he had a spherical balloon. perfected a dirigible balloon with a gasoline motor and screw propeller in the basket, but its first trial ended in failure. In 1899, with another balloon, the young man made a long, successful flight, which included the encircling of the Eiffel Tower.

Santos-Dumont won the Henri Deutsch prize of 100,000 francs, in 1901, for his trip from the Aero Club around the Eiffel Tower, which he made in a little over thirty minutes, the time set for the flight being one-half hour. The following year, he attempted to cross the Mediterranean, but an accident sent both himself and his balloon into the Bay of Monaco. In 1906 he completed an airplane in which he flew about 730 feet in twenty-one seconds. He was made Chevalier of the Legion of Honor in 1904, and received the Officer's Cross in 1909. He described his work in My Airships: A Story of My Life. When he died in 1932, he was buried in Rio de Janeiro with the honors usually accorded only to a chief of state. See AIRCRAFT.

SÃO FRANCISCO, souN frahN seesh' koo, OR SAN, sahn, FRANCISCO, RIVER, a stream of Eastern Brazil, which rises in the state of Minas Geraes and flows northeast, then eastward, forming the boundary between the states of Bahia and Pernambuco; it then turns to the southeast, finding an outlet in the Atlantic Ocean 1,800 miles from its source. Navigation on this great river is interrupted in several sections. As it leaves the mountains in Minas Geraes, it plunges over falls and rapids; for 1,000 miles of its middle course, it is a broad, navigable stream, but 200 miles from the Atlantic, it again becomes turbulent, for it makes its way over a series of rapids and a magnificent cataract called the "Niagara of Brazil." Beyond this, the river valley becomes a deep, narrow canyon, and ocean ships can navigate only the last 135 miles of the stream. Transportation along the unnavigable portions of the river is by railroad.

SAÔNE, solm, RIVER, a waterway in the east of France, known in ancient times by the Celtic name Arar, rises in the Faucilles Mountains, in the department of Vosges. It is the most important branch of the Rhone, which it joins at Lyons. Chalon-sur-Saône, a large industrial city of Burgundy, is also on its banks. The Saône is 300 miles in length, and is navigable for light vessels for 232 miles.

SÃO PAULO, souN pou' loo. See BRAZIL (The Cities).

SÃO PAULO DE LOANDA, souN pou' loo day lo ahn' dah. See Angola.

SÃO SALVADOR, souN sal vah dor'. Se Brazil (The Cities, Bahia).

SÃO VICENTE, souN ve sen' tay. See CAPE VERDE ISLANDS.

SAP, in botany, is the term applied to watery liquids which may be moving up or down the stems of plants. Because sap carries both mineral and organic foods used by the cells in

various parts of the plant, it is sometimes called the "blood of the plant." This simile, however, is far-fetched and gives an erroneous impression, since there is no circulation of sap comparable to the circulation of blood in animals.

Movements of Sap. Before discussing the movement of sap through the root and stem, it is necessary for us to know something of the structure of these parts of plants. The stem and root of a tree consist of a woody interior portion, which is ensheathed by a layer of bark. In the wood of both root and stem are many conduits, through which the sap moves. These conduits, which always stand vertically in root or stem, differ greatly in number and size from species to species. In the pine, for example, the wood is composed almost exclusively of conduits that are $\frac{1}{4}$ to $\frac{1}{16}$ of an inch in length, and about $\frac{1}{50}$ of an inch in diameter. Certain oaks, on the other hand, have a wood in which the conduits constitute but a small percentage of the wood, but one in which the conduits may be four to six feet in length, and 1/8 of an inch in diameter. In all stems, the conduits are non-living structures.

The surface cells of the roots take in the water from the soil by a process known as osmosis. This water which is taken in is not pure water, but contains numerous minerals in solution. From the surface cells of a root, the water, with the dissolved minerals, moves radially inward, by osmosis, until it reaches the conduits in the wood of the root. It then moves up through the conduits in the root, and from there into the conduits of the stem, and finally passes to the leaves. The force which causes the water and dissolved minerals (the sap) to ascend in the conduits is a pull, resulting from the evaporation of water from the leaves. In young trees, the water moves through conduits in all parts of the wood; in old trees, on the other hand, the conduits toward the center of the trunk are blocked, and the sap moves only through conduits in that portion of the wood which lies adjacent to the bark. This portion of the wood (the sapwood) can usually be distinguished from the portion through which the sap does not move (the heartwood) by the color of the two kinds of wood. Sapwood is usually light-colored, whereas heartwood is much darker in

Leaves are the organs of the plant in which carbohydrates are manufactured from carbon dioxide and water, and these carbohydrates in solution constitute another stream of sap which moves down the trunk. This sap ordinarily differs from that ascending the trunk in that it contains carbohydrates in solution. At certain times of the year, and in certain trees, as the sugar maple, the ascending sap may contain sugars or other carbohydrates in solution.

6384

The descending stream of sap differs from the ascending stream in that it does not move through the conduits in the wood, but through the soft part of the bark, which lies just outside the wood. It also differs in that the parts of the bark through which it moves are com-

posed of living cells.

Economic Uses. Many plants yield sap of economic value. The sugar of commerce is made from the sap of the beet and the sugar cane; and from the sap of the sugar maple, syrup and sugar are obtained. Plants also contain liquids that are not true saps, from the botanical standpoint. These liquids, of which the milky juice of the milkweed is a familiar example, generally move through special conduits that lie in either the wood or the bark. Many of these milky juices are, however, of considerable economic importance. Certain drugs, of which opium from the poppy is a good example, come from such milky juices. Milky juices of other plants yield substances of great commercial value. Of these, the juice of the rubber tree, from which most of the world's rubber is made, and the gums and resins are the most valuable in the arts. G.M.S.

Related Subjects. The reader is referred in these volumes to the following articles:

> Opium Osmosis

Rubber and Rubber Manufacture

Resins

SAPAJOU, sap' a joo. A group of American monkeys noted for their intelligence bear this name. The largest are over forty inch length, including twenty inches of tail. The largest are over forty inches in monkeys that are carried about the city streets by organ-grinders are usually sapajous. In South America the Indians capture them by shooting poisoned arrows, the substance used being curare. The captured monkeys are then given salt, which overcomes the effect of the poison.

Among the important kinds of sapajou are the white-fronted, found in the forests near the sources of the Amazon River, and known by their white forehead and light-brown color; the slender spider monkeys, occurring in the region between Southern Brazil and Central Mexico, and remarkable for their agility; and the weepers, or capuchins, which have the hair arranged on the head like a cowl, or friar's hood. In general, these monkeys are treedwellers and live chiefly on insects and fruit, though eggs, young birds, and reptiles are sometimes eaten. South American Indians hunt them for both their flesh and their fur. See Monkey. M.J.H.

SAPODILLA, sap o dil' ah. See GUTTA-Percha; Chicle.

SAPOTA, sah po' tah, TREE. See CHICLE.

SAPPHIRA, saf fi' rah. See Ananias. SAPPHIRE, saf' ire, a beautiful, transparent blue gem, ranking next to the diamond in hardness, and approximately equal to that stone in value. Sapphires vary in color from pale blue to deep indigo, but the most valuable stones have the tint of the cornflower. Yellow and white specimens, with the blue distributed in spots, are not uncommon. The sapphire is a variety of corundum, and is of about the same composition as the ruby, though somewhat harder than the latter. The chief sources of the gem are Siam, Burma, Ceylon, Kashmir, Australia, North Carolina, and Montana. The latter state supplies the greater part of the product for the American market, and one of the richest mines in the world is near the city of Great Falls. The museum of the Botanical Garden of Paris contains a fine collection of The gem is the birthstone for sapphires. September. See color plate, article GEMS. T.B.J.

Literary Reference. The exceeding beauty of the sapphire is suggested in a passage from Milton's Paradise Lost, where the stars are compared to sapphires:

. . now glowed the firmament With living sapphires; Hesperus, that led The starry host, rode brightest.

Related Subjects. The reader is referred in these volumes to the following articles:

Corundum Birthstones

Diamond!

SAPPHO, saf' o, a celebrated Greek lyric poetess who lived in the seventh and sixth centuries B.C. She spent most of her life in Les-



Some thoughtlessly proclaim the Muses nine: A tenth is Sappho, maid divine.

GREEK ANTHOLOGY. [The original of the statue shown above is in the Louvre, Paris.]

bos, and was called the "Lesbian nightingale." As head of a coterie, or school, of girls who devoted themselves to writing verse, she exercised much influence on the literature of her time. Indeed, the ancients admired her most extravagantly. Aristotle placed her in the same rank with Homer, and Plato called her the "tenth Muse," while Solon, on hearing one of her poems read, exclaimed that he would not willingly die until he had learned it by heart. Her lyrics were passionate songs of love and nature. and were arranged in nine books, one for each of the nine Muses. Of her poems, only two have come down to us entire—a beautiful Ode to Venus, and an ode descriptive of the emotions of love. Various fragments remain, but their beauty is lost in translation.

SAPROPHYTES, sap' ro fites. See Fungi; BACTERIA AND BACTERIOLOGY (Activities); FLOWERS (Strange and Unusual Flowers).

SAPSUCKER, one of a group of birds of the woodpecker family, found only in North America. They are so called because they feed on the sap of trees, which they obtain by



YELLOW-BELLIED SAPSUCKER

making holes in the bark. The most common species is the *yellow-bellied sapsucker*, the male of which has a bright-scarlet crown and throat, and black coat with white markings. This sapsucker nests in the Northern United States and Canada, migrating southward in winter as far as Central America. It builds its nest in holes in trees, and the eggs, which are pure white, are three to seven in number. The red-breasted sabsucker is at home on the Pacific coast. The adults of both sexes have the head, neck, and chest entirely red. The Williamson sapsucker is found in mountainous regions of the Western United States.

Sapsuckers have, in general, the habits of woodpeckers, but are for the most part harmful, as they injure trees, vines, and shrubs, often rendering wood unfit for use. found in large numbers, in any locality, it may be necessary to exterminate them. The Williamson species, however, does little damage. See WOODPECKER.

Classification. Sapsuckers belong to the family Picidae. The species are placed in the genus Sphyra-

SAPULPA, OKLA. See OKLAHOMA (back of map)

SAPWOOD. See ALBURNUM; SAP (Move-

ments of Sap).

SARACENS, sair' ah senz, a name applied to various peoples by the European writers of the Middle Ages. The Mohammedans of Palestine and Syria, the Arab Moors who set up a kingdom in Spain in the eighth century, and the Seljuk Turks, against whom the Crusaders fought, were all known as Saracens. The name was originally applied by the Greeks and Romans to wandering Arab tribes of the Syro-Arabian desert, who were a disturbing element along the frontiers of the Roman Empire.

Related Subjects. In connection with this article, the reader may consult the following topics in these volumes: Crusades Moors Seljuks

Mohammedanism Saladin Spain (History)

SARACEN WHEAT. See BUCKWHEAT. SARAGOSSA, sah rah gos' ah. See Spain (Principal Cities).

SARAJEVO, capital of the Austrian province of Bosnia in 1914, when Archduke Francis Ferdinand and his wife were assassinated there. See WORLD WAR I; SERBIA; YUGOSLAVIA.

SARAH, the wife of Abraham (which see). SARASVATI, sair' as wah te, Hindu goddess of eloquence, and consort of Brahma (which

SARATOGA, sair ah toh' gah, BATTLES OF. See REVOLUTIONARY WAR; FIFTEEN DECISIVE BATTLES.

SARATOGA SPRINGS, N. Y. See NEW York (back of map).

SARATOV, sah rah' tohf. See Russia (Principal Cities of the U.S.S.R.).

SARCOLACTIC, salar ko lak' tik, ACID. See LACTIC ACID.

SARCOLEMMA, sahr ko lem' ah. See Muscles.

SARCOMA, sahr ko' mah. See CANCER. SARCOPHAGUS, sahr kahf' ah gus, a stone coffin which is usually placed in a vault or chapel, instead of being buried. Examples of sarcophagi include the marble receptacles containing the bodies of George Washington and his wife, which may be viewed in the family vault at Mount Vernon; the resting places of the bodies of Ulysses S. Grant and Nikolai Lenin; and the coffin containing the ashes of Napoleon. The sarcophagi of the ancient Egyptians, who regarded these caskets as the

homes of their dead, are the oldest known. The bodies of the kings who built the pyramids for their tombs were placed in mummy cases, and these cases were placed in great, hollowedout blocks of granite. The cover of the stone receptacle often had the form of a curving roof, to carry out the idea of a house. Later, the sarcophagus itself was fashioned to resemble the swathed mummy. The Greeks and Etruscans followed the custom of elaborately decorating the sides of their stone coffins with figures in relief.

Derivation. The name, which is from a Greek word meaning flesh-eating, refers to an ancient belief that coffins made out of a certain stone found in Asia Minor would consume the bodies placed within them, in the space of forty days.

SARDANAPALLUS, sahr dah nah pa' lus, the Greek name for Assurbanipal (which see).

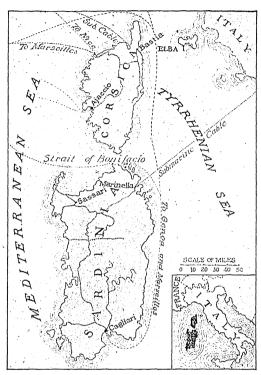
SARDINE, sahr deen', sometimes called pilchard, a small olive-green fish of the herring family, prized for its fine flavor. Sardines appear in the markets preserved in oil and canned. They are found in greatest abundance along the coasts of the Mediterranean Sea and the coast of the Bay of Biscay, France. The name, in fact, is derived from the circumstance of their having first been caught in large numbers off the island of Sardinia. They are in reality the young of the pilchard—the pilchard being the sardine "grown up." The length of the pilchard is about ten inches. It is common on the Channel coast of England. The cheaper grades of "sardine" found in American markets are usually the young of herring, menhaden, and other small fish. On the Pacific coast of the United States and Canada, however, is found a true sardine. This fish is of coarser flavor than the European species, and grows to be a foot in length, three times as long as the European sardine. Its body is dark bluish on the upper parts, and silvery below. Though excellent as a food fish, the pilchard, as it is commonly called, is the basis of a thriving industry in British Columbia because of its oil, which is used in the manufacture of toilet preparations, varnish, paint, and margarine. See HERRING.

How Sardines Are Canned. After the entrails have been removed, the fish are washed, dried, and placed in boiling oil. They are then drained and packed in tin boxes which are filled with pure olive or other oil. After the lids are soldered on, the boxes are placed in boiling water or subjected to the fumes of hot steam. Sardines anchoisées, or sardines cured in red wine, are a delicacy known in the south of France.

Scientific Names. The European sardine is Clupea pilchardus; the Pacific species is Clupea coeruleus.

SARDINIA, sahr din' ih ah, or SARDEGNA, an Italian island in the Mediterranean Sea. The

French island of Corsica, which was the birthplace of Napoleon Bonaparte, lies directly to the north, the two islands being separated by the Strait of Bonifacio, nine miles wide. Only one of the Mediterranean islands—Sicily—is larger than Sardinia. Including the coast islets,



SARDINIA AND VICINITY

The small corner map shows location of Sardinia and its sister island, Corsica, with respect to the mainland.

Sardinia has an area of 9,299 square miles—practically that of the state of New Hampshire. It is irregularly oblong in shape, is 168 miles in length, and about half as wide.

Commercially, Sardinia is important chiefly for its minerals and agricultural products. Mountains are found in nearly all parts, but those in the southwestern section are richest Lead, silver, zinc, antimony, in minerals. lignite, granite, and salt are the chief products of the mines. Wheat, oranges, olives, lemons, and grapes are raised on the fertile plains between the mountains, and cattle-raising has become important. About one-fifth of the land is forest-covered. The island has railroad facilities, and carries on a prosperous foreign trade, exporting minerals, wines, goatskins, olives, salt, and fish, and importing coal, cotton and woolen goods, and a variety of manufactured articles.

For administrative purposes, Sardinia is divided into two provinces, Cagliari and Sassari. The capital of the island is Cagliari, a city of

106,649 (1936), said to have been founded by the Phoenicians. Sardinia formed a part of the kingdom of Sardinia, the nucleus of the present Italian kingdom (see Sardinia, Kingdom of).

Population, 1,034,206 (1936).

SARDINIA, KINGDOM OF, a former Italian kingdom, which became the nucleus of the United Italy. It was made up of the islands of Sardinia and Caprera, the principality of Piedmont, the county of Nice, the duchies of Savoy, Aosta, Genoa, and Montferrat, and part of the old duchy of Milan. By a treaty made with Austria in 1720, the Duke of Savoy gave up Sicily, but gained in exchange Sardinia, and acquired the right to constitute his dominions a kingdom. Sardinia, though it gave its name to the new realm, was by no means the important part, for the capital was Turin, in Piedmont, and there the affairs of the kingdom centered. The first king of Sardinia was Victor Amadeus I, who, ten years after the formation of the kingdom, abdicated in favor of his son, Charles Emmanuel I. During his reign, some additions of territory were made.

Savoy was invaded by the French in the Revolutionary period, and that duchy, together with Nice and, later, Piedmont, was surrendered to France. Indeed, when Victor Emmanuel I came to the throne, in 1802, nothing but the island of Sardinia remained to him. The readjustment after Napoleon's downfall gave back the original territory, adding that of the republic of Genoa, but Victor Emmanuel I was very unpopular because of his illiberal policies, and in 1821 he was forced to abdicate. Charles Albert, who came to the throne in 1831, granted liberal reforms to his people, and in 1848, the year of general revolution, he put himself at the head of the forces which were trying to free Italy from the Austrians. In the next year he was defeated at Novara, and, in consequence, abdicated in favor of his son, Victor Emmanuel II. It was during the reign of this king that the struggle for freedom and a United Italy reached its climax. He was made head of the new government, Rome becoming the capital of United Italy.

Related Subjects. In connection with this article on the kingdom of Sardinia, the reader may consult in these volumes the following topics:

Bonaparte, Napoleon Sardinia
Genoa Savoy, House of
Italy (History) Turin
Piedmont Victor Emmanuel

SARDONYX, salr' doln niks, an ornamental stone, one of the forms of quartz, consisting of alternate layers of white and red or reddishbrown, the red layers being partially transparent carnelian. Sardonyx is a variety of onyx. It was formerly used for the stone in signet rings. It is supposed that a sardonyx was one of the stones in the breastplate of the high priest of the Israelites (Exodus XXVIII,

20), but this is a matter of uncertainty, because we do not know whether the name was then given to the same stone as now. Sardonyx is mentioned by Saint John in his description of the Holy City (Revelation XXI, 20), as the fifth of the foundation stones. Some theologians consider sardonyx to be the emblem of spiritual strength.

Related Subjects. The reader is referred in these volumes to the following articles:

Birthstones Carnelian Gems High Priest

Onyx Quartz

SARDOU, sahr doo', VICTORIEN (1831-1908), a French dramatist, born in Paris. He was too poor to complete the medical education he

attempted to secure, and gained a livelihood successively as tutor and as a writer of reviews and articles for popular encyclopedias. His first dramatic attempts were far from successful; his troubles induced a severe attack of typhoid fever, during which he was found almost in a dying condition in his lonely garret, with nothing at hand except rejected manuscripts.



SARDOU

After his recovery, Sardou's literary future became brighter, and he produced plays with astonishing rapidity—sometimes as many as four a year. These were chiefly comedies, characterized by wit, clever satire, rapid movement, and easy dialogue. Among his early successes were Candide and Fêdora. The character of Sardou's work did not increase the prestige of the stage, but his popularity secured for him election to the French Academy in 1878, and his plays brought him a fortune.

His Writings. His social satires include Nos Intimes, Les Vieux Garçons, Ragabas, Le Roi Carotte, and Divorçons; his historical plays are Patrie, La Sorcière, La Haine, La Tosca, Madame Sans-Gêne, Thermidor, and Robespierre.

SARG, Tony (1880), a versatile artist who is best known as the producer of marionette shows. He was born in Guatemala, the son of a German plantation-owner. Educated in Germany, Tony Sarg began his artistic career in London as illustrator for a marmalade company. During the World War, he removed to America, and speedily won a reputation through his illustrations for Irvin Cobb's Speaking of Operations. His interest in puppet shows led to their commercial development. He also makes animated moving-picture cartoons.



APPROXIMATE LOCATION OF THE SARGASSO SEA

SARGASSO SEA. Except, possibly, for some adventurous Phoenician galley, the keels of Columbus' caravels were the first to cut through the weeds of the Sargasso Sea. Columbus himself was not alarmed, but merely interested, by the appearance of large quantities of seaweed on the surface of the ocean some 2,000 miles to the westward of the Canaries. His sailors, however, were terrified, for the very practical and natural reason that they could not conceive of seaweed without rocks for it to grow on, and they feared every instant that the ships would run upon the rocks and be dashed to pieces. To reassure them, Columbus threw out the lead line. It ran out to 200 fathoms, and did not then touch bottom, and the three tiny vessels adventured onward, dragging long streamers of weed.

onward, dragging long streamers of weed.

Long a Mystery. The Sargasso Sea, which long remained almost as much of a mystery as it was to Columbus, has been studied until the old superstitions have been completely exploded, or reduced to their basis of demonstrable fact. Since 1900, three important scientific expeditions have penetrated it. The last of these was the voyage of the Arcturus, in 1925. The Arcturus did not add much to their findings; but that another expedition was undertaken proves that the Sargasso Sea still holds its problems for scientists.

The name "Sargaço," now changed to "Sargasso," was given to the weed-covered area by the Portuguese, and might be translated "sea of little grapes." This meaning is explained

by the tiny bladders which are found by thousands in the weeds, and which early navigators supposed to be their fruit. Like the larger bladders of kelp and other seaweed, they are simply nature's device to keep the weeds afloat.

The Legend Persisted. Neither Columbus nor his men understood the great currents that draw the debris of the Atlantic into the eddy between them, like the cluster of bubbles in the middle of a cup of tea when it is stirred round and round. It was this discovery that started the imaginations of scientists and fiction writers alike to building up the conception of the interior of the Sargasso Sea that prevailed for so long.

To be sure, ever since the time of Columbus, ships have sailed again and again across the great Sargasso area, and nothing worse has happened than getting their bottoms fouled, or being caught in the calms which are normal in those latitudes, but the legend persisted. Out of the mists of antiquity was resurrected the story of Atlantis, and the missing continent was imagined as beneath the Sargasso Sea, which is quite large enough to have been the location of a good-sized land area.

Novelists pictured a blanket of netted weed from which no vessel could escape when once entangled in it; all the derelict ships of centuries were pictured as huddled in a revolving and rotting mass—formless, barnacled, weedgrown hulks of old galleons in the center; then skeletons of more modern slavers; pirate craft and the brave ships of Revolutionary days; then wrecks of smart clippers and sturdy whalers; and, finally, an outer fringe of the latest marine catastrophes.

A writer in Chambers's Journal, as late as 1894, published the following, which we now

know to be a ridiculous statement:

It is doubtful whether a sailing vessel would be able to cut her way into the thick network of weed even with a strong wind behind her. Besides, if the effort were rewarded with a first delusive success, there would be the almost certain danger that, in the calm regions of the Sargasso Sea, the wind would suddenly fail her altogether, leaving her locked hopelessly amid the weed and the drift and the wreckage, without hope of succor or escape. With regard to a steamer, no prudent skipper is ever likely to make the attempt, for it would certainly not be long before the tangling weed would altogether choke up his screw and render it useless.

Latest Expedition. The most recent expedition to the Sargasso sailed February 10, 1925, from New York, in the ship Arcturus, under the direction of William Beebe, explorer and scientist, and under the auspices of the New York Zoölogical Society. Accompanying the expedition were scientists from several institutions, artists, and a motion-picture photographer.

The Arcturus, a wooden ship 280 feet long, with a beam of 46 feet, is said to be the largest vessel ever used for scientific work of this kind. Its build, with high bulwarks and curved frame. is faintly suggestive of a modern version of an ancient galleon; but the needs of science embellished it with many structural oddities.

The propeller was enclosed in a weed-proof wire cage. From a point amidships, supported by a boom, was placed a platform which could be lowered twenty or thirty feet below the surface, and from which a scientist in diving dress and helmet could observe what is going on in the depths. Round the hull of the vessel, just above the water line, there was placed a wooden footpath, with hand ropes, along which members of the expedition might pass to study the expected field of seaweed at close quarters. From the bow projected something like a cowcatcher, which could be raised or lowered, and from which, in calm weather, a net or harpoon could be used.

There were glass windows in the bottom of the ship, and it was provided with a fleet of small glass-bottomed boats for further observations. The vessel carried laboratories, tanks,

cages, and a scientific library.

The Arcturus scientists reported that they brought up glass sponges, surface insects, and volcanic rock from a depth of three and a half miles. They also mentioned that they found red shrimps, luminescent fish, specimens of octopus, and "new living species." The scientists were obliged to hunt for three weeks

before they found a good-sized patch of weed. and did not see a single rotting galleon or Phoenician galley; these derelicts never existed, except in vivid imaginations. Thus the sea loses more of its romance. See Ocean (Ocean Currents).

SARGENT, DUDLEY A. See the article PHYSICAL EDUCATION (Development through

the Centuries).

SARGENT, John Singer (1856-1925), an American portraitist and painter of landscape and figure pieces. He was born in Florence, Italy, of American parents, and in that city

commenced his art studies. At the age of eighteen, Sargent began studying with the French artist Carolus Duran, of Paris, whose influence was permanent and beneficial. He also studied in Germany. He exhibited in the Paris Salon regularly from 1878 to 1884, receiving in 1881 a secondclass medal for his Portrait of a Young Lady. This painting was the subject of an appreciation by the



JOHN SINGER SARGENT

novelist Henry James. In 1884 Sargent settled permanently in London, where his reputation as a portrait painter steadily advanced. Among the honors he won were the Grand Prize of the Paris expositions of 1889 and 1900, the Grand Prize for painting at the Saint Louis Exposition in 1904, and the gold medal of the National Institute of Arts and Letters (American), awarded in 1914. In 1917 he was commissioned by the governors of the National Gallery of Ireland to paint for that institution a portrait of President Wilson.

Summary of His Work. Sargent painted portraits of some of the most prominent men and women of his time, including Carolus Duran, Claude Monet, Edwin Booth, Lawrence Barrett, Joseph Jefferson, Ellen Terry as Lady Macbeth (exhibited in Chicago in 1893 at the World's Columbian Exposition), Theodore Roosevelt, John Hay, and Dr. S. Weir Among figure pieces are his exquisite Mitchell. Carnation Lily, Lily Rose (Tate Gallery, London), representing two girls lighting Japanese lanterns in a flower garden; and Carmencita, a dancer in costume. Among the glories of the Boston Public Library are his splendid mural decorations, including the celebrated frieze of the Hebrew Prophets. Landscapes and figure pieces constituted the bulk of his work after 1909, and his later canvases included The Weavers, The Courtyard, The Fountain (Art Institute, Chicago), and Trout Stream in the Tyrol.

SARGON, sahr' gon, founder of an Assyrian dynasty. See Assyria (History).

SARGON OF AKKAD, ahk' ahd. See Baby-LON.

SARJEKTJOKKO, MOUNT. See SWEDEN (The Land).

SARK. See CHANNEL ISLANDS.

SARNIA, ONT. See CANADA (back of map). SARNUS RIVER. See POMPEII.

SARSAPARILLA, sahr sah pah ril' ah, a drug obtained from the dried roots of different species of smilax, found in Central and South America and Mexico. The roots are several feet long, and about as large around as a goose quill. Modern physicians and chemists hold that the drug is inert, that is, has no curative properties, but it once had a wide reputation as a spring tonic, and Lowell, Mass., became an important center for the manufacture of medical preparations of the drug. Sarsaparilla is used to some extent as a flavoring for icecream soda. It is no longer of commercial value as a patent medicine. See SMILAX.

SARTO, sahr' toh, ANDREA DEL (1486-1531), a great Florentine painter of the Italian High Renaissance. He was one of the greatest colorists of his day; his style was dignified and his drawing masterly, and such was his knowledge of technique that he was known as the "Faultless Painter." His real name, according to some accounts, was ANDREA VANUCCHI, but

he was nicknamed Del Sarto, meaning the tailor's son, because of his father's trade. He studied under several Florentine masters, and before he was thirty, painted a series of seven frescoes in the Santa Annunziata, the church of the Servites, at Florence. These paintings were followed by another notable series of frescoes, illustrating ten scenes from the life of John the Baptist. In 1519 he received a commission from Francis I of France to purchase works of art, but was accused of squandering the money entrusted to him, and was thenceforth forbidden to return to France. He spent the remainder of his life in Florence. Andrea del Sarto was the subject of Browning's famous poem, called by his name, which presents the painter in a sympathetic light, and his wife unfavorably.

Summary of His Work. The most celebrated of his single pictures are the Madonna del Sacco, for the Servites; the Last Supper, in the refectory of the Convent of San Salvi, near Florence; and the Madonna of the Harpies, now in the Uffizi Gallery. The frescoes in the Santa Annunziata are his most celebrated. In addition, he painted many other Madonnas, Holy Families, and similar subjects for altarpieces. His oil paintings are to be found in almost every gallery of Europe.

SARTO, GIUSEPPE. See PIUS (X).



ASKATCHEWAN, sas katch' e wahn, a province of the Dominion of Canada, formed in 1905 from the eastern half of the District of Athabaska and the greater part of the districts of Saskatchewan and Assiniboia. It lies between Manitoba on the east and Alberta on the west. The United States extends along its southern border, and the Northwest Territories bound it on the north. Three of the boundaries are marked by meridians and parallels of even degrees. The western boundary is longitude 110°; the southern boundary, parallel 49°; the northern, parallel 60°; and the eastern boundary deviates only slightly from longitude 102°.

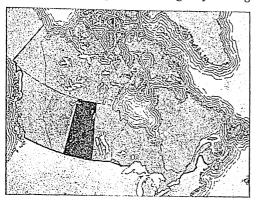
Area and Population. Saskatchewan extends along the border of the United States for a distance of 393 miles; its northern boundary has a length of 277 miles, and its length from north to south is 760 miles. The area is 251,700 square miles, of which 13,725 square miles are water. The province is a little larger than Colorado and Montana combined, and more

than twice the size of Great Britain and Ireland.

The People. The rapid growth of Saskatchewan is revealed by its increase in population. In 1901 the old District of Saskatchewan had 91,279 inhabitants; in 1911 the province had 492,432 inhabitants, an increase of 439.48 per cent; this number increased to 757,510 in 1921, and 921,785 in 1931. The 1941 census placed the population at 895,992. In 1911 there were 1.05 inhabitants to the square mile, and in 1931 the density had increased to 3.66. However, the settled portion of the prov-ince is confined to the southern half, so the number of people to the square mile for the part of the province that is settled is greater than the foregoing figures indicate. The rural population is about double the urban. Regina is the capital city.

The greater portion of the population is made up of people from Great Britain and Ireland, and the other principal groups are immigrants from the United States, Germans, Scandinavians, Russians, French, Austrians, Ruthenians, and Indians.

Surface and Drainage. The western part of the province lying between the Saskatchewan River and the United States boundary consists of open, rolling prairie and gently rolling



For political map and map data of Saskatchewan, see Canada (map).

plain. The region is dotted here and there with clear lakes and clumps of trees, and there are wide stretches which are unbroken for long distances by slope or declivity, while, as far as the eye can reach, the view is not obstructed by a single tree.

That part of the province extending to the northern forest belt and east and north of a line drawn from the intersection of 102° longitude and 49° latitude to the town of Lloydminster on the Alberta boundary is a large area of mixed prairie and woodland. This beautiful section is usually referred to as the park belt.

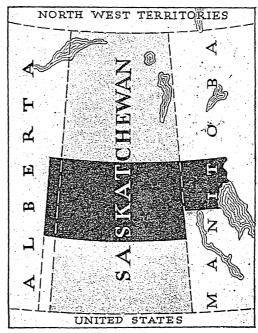
Much of the region between the Saskatchewan and Churchill rivers is a parklike country consisting of forests and open areas suitable for agricultural purposes. North of the Churchill River, the country is in the Great Canadian Shield and owing to glaciation, the relief is comparatively low and rocky with areas of light sandy soil. The northern forest belt extends over this area to the northern boundary of the province. The highest altitude in the province is in the Cypress Hills, which reach an elevation of 4,654 feet.

Rivers and Lakes. The southern and central parts of the province are drained by the Saskatchewan, the Assiniboine, the Souris, and their tributaries. The Qu'Appelle (Who Calls) River runs eastward across the southern half of the province, and empties into the Assiniboine just beyond the boundary of Manitoba. The Churchill River flows across the central part while the tributaries of Lake Athabaska drain the extreme northwestern part of the province. These two drainage basins contain

thousands of lakes varying greatly in size, the largest of which is Reindeer lake. These northern lakes are all freshwater and teem with fish. The comparatively few lakes on the prairie portion of the province are shallow and some are more or less alkaline. Many lakes in the settled portion of the province are being developed as summer resorts, some of the more important being Jackfish, Waskesiu, Little Manitou (the "Carlsbad of America"), Madge, Last Mountain, the Qu'Appelle Lakes, and the Carlyle Lakes. Provincial parks, game sanctuaries, and forest reserves have been established in the vicinity of many of these delightful camping grounds.

Climate. Winters are bright and cold, but

Climate. Winters are bright and cold, but the atmosphere is dry and bracing, so a lower temperature is more invigorating here than in a humid section. The southwestern corner of the province forms a remarkable exception to winter conditions elsewhere, because of the

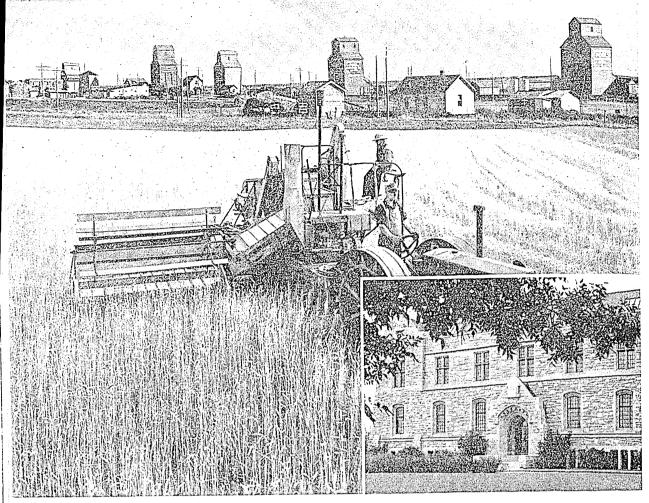


FORMATION OF THE PROVINCE

The area in solid black was the district of Saskatchewan before the organization of the province of the same name in 1905. The broken lines through the black area indicate the portion of the district that was included in the province. To the north and south the shaded areas are the parts of the former districts of Athabaska and Assiniboia which were included in the province of Saskatchewan.

influence of the chinook winds, which make the winters in that section subject to very mild spells even in midwinter. Rainfall is plentiful, except in the southwestern part. See Chinook.

Plants and Animals. The open country in

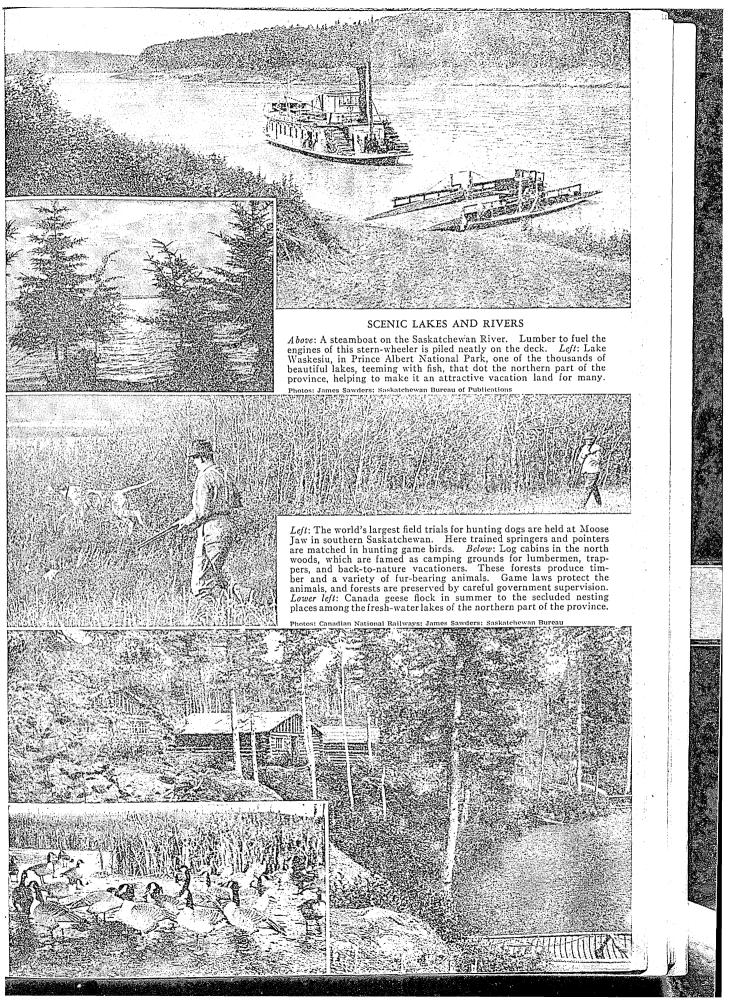


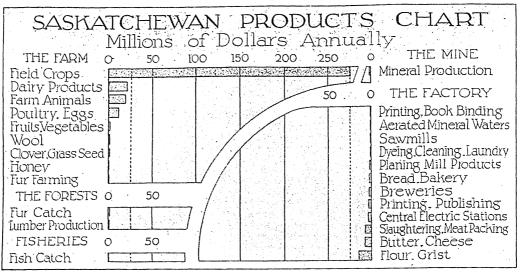
FARMING IN SASKATCHEWAN

Above: Reaping the harvest in Saskatchewan, leading wheat-producing province of Canada. Silhouetted on the skyline are grain elevators where the grain is stored until it can be transported to milling centers. Above right: The

Field Husbandry building of the College of Agriculture, at the University of Saskatchewan in Saskatoon. *Below*: Shearing sheep on a ranch near Regina. The fleeces are packed tightly in bales and sent to market by truck or rail.







From Dominion government reports; figures represent annual averages.

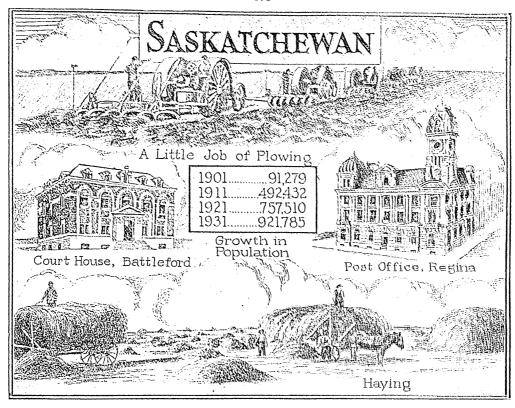
the park and prairie regions is covered with native grasses and wild flowers. The grasses make excellent hay. Between the Saskatchewan and the Churchill rivers are large forest areas, which constitute about one-third of the province, although much of it is not commercial timber. There are thirteen forest reserves comprising 10,223 square miles and seven provincial parks with an area of 1,146 square miles. All forests and public lands are owned and administered by the provincial government. Timber is sold by license or sale on the basis of public auctions. Poplar, birch, and jackpine predominate on the highland, spruce and tamarack on the lowland. North of the Churchill the forest is chiefly cone-bearing trees.

Animals. In the forests are found the animals common to this northern latitude, the bear, the wolf, the mink, the otter, the fox, the skunk, and the muskrat, all valuable for their fur. Since there is danger of some of these animals being exterminated by overhunting, the Saskatchewan government has enacted stringent game laws. Elk, moose, and deer roam the forests in the north, and the pronged antelope is found in the rolling country in the southwest. In summer the lakes are frequented by thousands of waterfowl that seek these secluded regions for nesting. The rivers and lakes abound in fish. The fish from the cold-water lakes of the north have a superior quality and flavor, and are in demand in the United States and Canada. Whitefish, pike, pickerel, and trout, in the order named, yield the largest returns.

Minerals and Mining. There are large deposits of lignite near Estevan and along the Souris River, in the southeastern part of the province. Coal mines are also in operation near Wood Mountain, and deposits have been discovered west of Saskatoon. Around Beaver Lake, copper claims have been staked. Platinum has recently been discovered in Northern Saskatchewan. Gold, silver, and petroleum are known to exist in the province. Clay of good quality occurs around Estevan and in several other localities, and deposits of soapstone and glass sand occur near Pipestone Lake.

Agriculture. Saskatchewan is by far the leading province of the Dominion in the production of wheat, and the second in the production of livestock. Both soil and climate are especially adapted to the production of this grain of the highest grade, and Saskatchewan wheat has won the first prize in a number of agricultural exhibitions in Canada and the United States. Other important grains are oats, barley, and rye. Flax is also raised to a considerable extent. The average yearly value of the field crops is about \$330,000,000, more than half of which is wheat. Potatoes and root crops are successful throughout the province, and small fruits are grown. Grass and other forage crops are abundant, and contribute largely to the success of the livestock industry in the northern and eastern sections.

The southwestern section lies within the area affected by the chinook winds, and is especially suited to raising horses and cattle, since stock can be pastured throughout the year. The park region is destined to become a great dairy region. Pure water, a cool climate, and excellent pasturage all tend to the production of butter of the best quality. The dairy branch of the Department of Agriculture undertakes to grade all the export butter of the province. Horses, beef cattle, sheep, and swine are raised



in large numbers, and the poultry industry is not inconsiderable.

The College of Agriculture at Saskatoon, besides maintaining an experimental farm, does extension work throughout the province. A "better-farming" train traverses the province periodically, and a special dairy car visits the dairy districts. Further instruction is given by lectures, bulletins, and farm pamphlets. Home-makers' clubs, with branches in all rural sections, and local agricultural societies, many of which receive government aid, all combine to make rural life pleasant, progressive, and in every way worth while. One of the terrors of the Saskatchewan farmer is the occasional hailstorm, which leaves his growing crops beaten into the ground. To meet this possible loss, a tax is levied which insures the farmers against crop injuries due to hail.

Manufactures. The value of the manufactured products is in excess of \$60,000,000, but manufacturing is still in the early stage of its development, though it promises to be an important industry. The leading products are lumber, bricks, paper products, flour, nonmetallic minerals, and vegetable and animal products. The province has great waterpower possibilities; more than 1,080,000 horse power is available but only 90,835 horse power has been developed.

Transportation and Communication. Two great railway systems—the Canadian Pacific and the Canadian National (government)—traverse the province from east to west. Besides its main line, each system has numerous branch lines; the settled portion of the province is thus well supplied with railways. The most important railway centers in this section are Regina and Moose Jaw, in the south; Saskatoon, in the center; and Prince Albert, in the north. There are a little more than 8,600 miles of railway in operation. Saskatchewan has over 265,000 miles of telephone wire under public control, extending to practically every hamlet, as well as to many farms.

Education. The school district is the unit for local education, and free public schools, attendance upon which is compulsory, are maintained throughout the province. The school system is in charge of the minister of education, who is a member of the executive council. The University of Saskatchewan at Saskatoon, and provincial normal schools at Regina, Saskatoon, and Moose Jaw are maintained by the provincial government. There are also a number of educational institutions of high order under control of the various religious denominations. Among these are Saint Andrew's Theological College, Saskatoon, and Regina College, Regina (United

OUESTIONS ON SASKATCHEWAN

(An Outline suitable for Saskatchewan will be found with the article "Province.")

In what very important agricultural product does Saskatchewan rank first among the provinces of Canada?

What proves the unusual excellence of this product?

How does the provincial government supervise the cutting of the forests?

What is there curious and interesting about the boundary lines of this province?

Why is the northern boundary so much shorter than the southern?

How does the greatest altitude of this province compare with those of the provinces which bound it on the east and west? With those of the states of the American Union upon which it borders?

What state of the United States does this province most closely resemble in area? (See list in article United States.) What country of Europe? What country

of Asia?

How do these political units which it resembles in size compare with it in population?

What was the attitude of Saskatchewan during the World War?

Why are the winters in the southwestern section warmer than winters elsewhere in the same latitude?

How does the province compare in density of population with the Dominion as a whole? With the provinces to either side of it?

Is Saskatchewan largely a "city" province or a "country" province—that is, do the majority of the people live in towns or under rural conditions?

In what way does the southern part of the province resemble in its surface features Illinois or Iowa?

What large lake lies partly in Saskatchewan and partly in Alberta? How large is it?

How many lakes in Canada have a greater area?

What are the most favorable features of the climate? What is the most unfavorable, from the point of view of the farmer?

Why have strict game-preservation laws been necessary?

Why are Saskatchewan fish in demand elsewhere? What are the principal kinds? What advantages has the northeastern section which fit it especially for the raising of cattle and the making of butter?

How does the government help the farmers to dispose of their butter?

What "extension" work does the College of Agriculture do to help the farmers in their homes?

Who was Louis Riel?

What part did he play in the history of the province and in that of Canada as a whole?

What is the railroad mileage of the province to each hundred square miles of area?

How does it compare in this respect with the provinces and states upon which it borders? With Canada as a whole?

Why was this region first entered by the white men?

When was the first permanent settlement made in this western region? Was that settlement within the present limits of Saskatchewan?

What have been recent tendencies in the enactment of laws by the provincial legislature?

When did Saskatchewan become a province of the Dominion? What territories contributed to the present area?

How is the province represented in the Dominion Parliament? How many houses in its legislature? What are they called?

Church); Emmanuel College, Saskatoon, and Saint Chad's College, Regina (Anglican); Luther College, Regina (German Lutheran); Outlook College, Outlook (Norwegian Lutheran); and Campion College, Regina (Catholic).

Government. The provincial government is headed by a lieutenant governor, appointed by the Governor-General of the Dominion. There is one legislative chamber, consisting of sixty-three members, elected by the people from the various constituencies for a term of five years. From the majority party in the legislature, certain members are selected to fill the chief executive offices of state. These are cabinet ministers who may hold office so long as they can command the support of the majority in the legislature, and their chief officer is the prime minister. The province is represented in the Dominion Senate by six members; in the House of Commons, by twenty-one members. Women may vote and hold office. See Parliament Building, page 6045.

History. Saskatchewan was a part of the vast territory which, under the name of Rupert's Land, was controlled by the Hudson's Bay Company. Long before there was any attempt to found settlements in the country north and west of the Great Lakes, this company had established trading stations around Hudson Bay and far inland to the south and west. Between 1811 and 1817, a permanent settlement was founded in the valley of the Red River, under the direction of the Earl of Selkirk, who had obtained a controlling interest in the Hudson's Bay Company. This settlement, which was in the present province of Manitoba, constituted the beginning of the political organization of the great Canadian Northwest. Soon after the organization of the Dominion of Canada, in 1867, measures were taken to secure control of the Hudson's Bay Company's rights, and these rights were purchased the following year for \$1,500,000, with certain reservations to the company.

The entire region north and west of the provinces of Ontario and Quebec became known as the North-West Territories (now Northwest), and was divided for the purpose of administration into a number of districts. In 1870 the province of Manitoba was organized. With the completion of the Canadian Pacific Railway, in 1885, immigration began to flow into the vast fertile region north of the United States. With the increase of population came an increasing demand for responsible local government, and in 1905 the provinces of Alberta and Saskatchewan were organized.

A local uprising, headed by Louis Riel, occurred after the opening of the country to settlement. It was known as the Saskatchewan Rebellion (which see).

The assembly has shown foresight and liberality in the enactment of laws for promoting

agricultural, industrial, and educational interests. In recent acts, various coöperative facilities have been offered the farmer to aid in the marketing and the storing of his products. In 1920 the province adopted a stringent prohibition law, but in 1925 government sale was adopted. The province made large contributions of men, money, and supplies to the Allies in World War I. During World War II, Saskatchewan co-operated fully in carrying forward Canada's war effort.

Related Subjects. The reader is referred to:

CITIES AND TOWNS

Regina

Saskatoon

HISTOR

Hudson's Bay Company

Riel, Louis

PRODUCTS AND INDUSTRIES

Butter Dairying Lumber Oats Wheat

WATERS

Assiniboine River Athabaska Churchill River Saskatchewan River

SASKATCHEWAN REBELLION, a rising of the half-breeds in Canada in 1885, under the leadership of Louis Riel. Shortly after the collapse of the Red River Rebellion (which see), the Canadian government granted to each of the métis, or half-breeds, 240 acres of land. For a time this generosity seemed to have solved a difficult problem, but as Manitoba began to fill with settlers, many moved westward and settled on the banks of the Saskatchewan River. There they were again disturbed by the advance of the settlements, and particularly by the construction of the Canadian Pacific Railway. The Indians and half-breeds resented, first, the threatened extinction of the buffalo herds, on which they depended for food; secondly, they feared that their lands, to which they had no patents or titles, would be taken from them, and they were dissatisfied with the government's method of surveying, which eliminated the old French system of having all farms front on the river.

With these difficulties ahead of them, the métis, in 1884, called on Louis Riel, who was then in Montana, to help them maintain their rights. In the following March, Riel was elected president of the provisional government which the métis established at Saint Laurent. At first Riel was moderate, and there was hope that the government would eventually make the wanted concessions. Before the government could make up its mind, an unfortunate encounter took place at Duck Lake between some of the Mounted Police and a band of métis. This skirmish was followed by a rising of the Cree Indians, who, led by Big Bear, attacked a little settlement at Frog Lake. The men were killed, and the women and children

carried away. The news of the outbreak caused great excitement in Eastern Canada. A force of 4,400 men was hastily collected, and in two months' time, they were ready for combat.

These troops were divided into three units, and the rebellion was speedily quelled.

Results of the Rebellion. Although insignificant from a military point of view, the rebellion had important results. It led the Dominion government to recognize the claims of the métis, and to give them deeds to their The lands. North-West (now Northwest) Territories, in view of their increasing importance, were given representation in Parliament. But the most important effect was that it broughthometo all Canadians



RIEL REBELLION MEDAL

North-West Canada medal granted to all who served in the rebellion. The word Saskatchewan appeared only on the medals of those who were present at the actions of Fish Creek, Batoche, and Frenchman's Butte. The reverse side contains the head of Queen Victoria and the words, Victoria regina et imperatrix.

the reality of Confederation, and stimulated national feeling. See Canada (History of Canada: Expansion of the Dominion); RIEL, LOUIS.

A.R.B.

SASKATCHEWAN RIVER, a Canadian stream which forms, together with the Nelson River, the greatest river system flowing into Hudson Bay. The Saskatchewan has a length of 1,205 miles from its mouth to the source of its chief tributary, the Bow. The area which this system drains includes 158,800 square miles, an area more than one and one-half times as large as that of the Great Lakes. The river is narrow and rapid throughout most of its course. "Saskatchewan," in fact, is a Cree Indian word meaning rapid-flowing river.

The Saskatchewan is formed by the junction of the North and South Saskatchewan, which unite near Prince Albert, in the province of Saskatchewan. The Saskatchewan proper is 240 miles long, and flows east to the northwest corner of Lake Winnipeg.

The North Saskatchewan, which is about 760 miles long, has its rise in the glaciers on Mount Hooker, in the Rocky Mountains of Alberta. Flowing eastward across Alberta, it skirts the southern border of the northern coniferous forests, and meets the south branch slightly more than halfway across Saskatchewan. The South Saskatchewan, which is 865 miles long and is usually regarded as the main stream, has several head streams, some of which rise in Northern Montana. Although the waters of this stream are less important for navigation than those of the north branch, they are of untold value for irrigation. See Alberta (Irrigation); Winnipeg (lake). A.R.B.

SASKATOON', SASK., a city in the central part of the province, situated on the South Saskatchewan River, on the Canadian National Railway, with distributing lines of this system and the Canadian Pacific radiating in nine directions. It is 311 miles by the shortest route southeast of Edmonton, 160 miles northwest of Regina, 400 miles northeast of Calgary, and 467 miles northwest of Winnipeg. The city takes its name from a small shrub and its berry, called saskatoon by the Blackfoot Indians. Saskatoon was founded in 1890, but as late as 1901 was merely a village of a hundred people. It was incorporated as a city in 1906, and adopted the commission form of government in 1910. Population, 43,027 (1941).

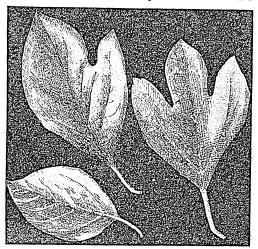
Industry. Saskatoon is one of the most important cities in the Canadian West. It is at once a railway center and a commercial and manufacturing center of importance. It has now over 200 wholesale houses, is a large shipper of wheat, as it is the center of a hard-wheat belt, and has one of the great interior elevators (capacity 3,500,000 bushels) erected by the Dominion government. Its largest manufacturing establishments are the mills of the Quaker Oats and Robin Hood companies. Ironworking and the manufacture of garments are other important industries.

Education. Saskatoon is the seat of the University of Saskatchewan, which includes a college of agriculture. The city also has a provincial normal school, a school for the deaf, three collegiate institutes, a technical school, Saint Andrew's (United Church) College, Emmanuel (Anglican) College (founded at Prince Albert in 1879, but removed to Saskatoon in 1909), and good public schools.

A.R.B.

SASSAFRAS, sas' a fras, a tree of the laurel family, whose aromatic bark yields an oil used in flavoring medicine. Drug and fruit stores sell the bark and roots to people who wish to make the spring tonic known as "sassafras tea." A sticky substance, obtained from the leaves and twigs, is used in the Southern United States to flavor gumbo soups. The tree is found from Southern Vermont to Florida and Texas, and west as far as Kansas. It is usually from thirty to fifty feet high, though along roadsides, it often grows merely as a shrub. In autumn the tree is strikingly beautiful, with its rich gold and scarlet foliage. The leaves are of

three different shapes, ovate, two-lobed, and three-lobed, and all three kinds are found on one twig. The flowers are yellow and the fruit



SASSAFRAS LEAVES
Showing variations in form.

is a dark-blue berry. Sassafras wood is strong and light, and is used for making posts and rails.

G.M.S.

Scientific Name. The sassafras tree belongs to the family Lauraceae. Its botanical name is Sassafras sassafras.

SASSAFRAS MOUNTAIN. See SOUTH CAROLINA (The Land).

SASSANIAN, sas a' nih an, MONARCHY. See Parthia.

SATAN. See DEVIL. SATEEN. See SATIN.

variable, stars.

SATELLITE, sat' e lite, a word derived from the Latin satelles, meaning an attendant. In astronomy, the term is used to describe a celestial body revolving around a planet, such as our moon, which follows the earth in its journey round the sun. The name is also used to describe those fainter or dark bodies which revolve about certain stars and cause their light to grow dimmer at various intervals. This phenomenon produces the eclipsing, or

The following table gives the number of satellites attending the planets of our system, although there is some uncertainty about the tenth satellite of Saturn:

Saturn	Mars	2
Jupiter 9	Neptune	I
Uranus4		

Related Subjects. The reader is referred in these volumes to the articles listed below, and to the articles on the planets given in the table above.

Astronomy Moon Solar System Eclipse Planet Star

SATIN, a glossy, silken fabric, which is woven in such a way as to reduce the number

of crossings of weft or warp; when the fabric is run through hot rollers, it acquires its unbroken, glossy surface. Satin is made plain, damasked, open-worked, striped, or embroidered, and may have a plain or crêpe back. Dresses, underwear, hats, and cushion covers are some of the articles for which use is made of the different varieties of satin, from the thin, washable kinds to the heavy, stiff Duchess satin. The chief centers of satin manufacture are Lyons, France, and Genoa and Florence, Italy, although large quantities are now made in Great Britain and the United States. Cotton, and sometimes woolen, imitations of satin are known as sateens.

SATIRE, the name given by the Romans to a type of poem in which men and manners were held up to ridicule or scorn, often of the most scathing sort. With some poets, the object of the ridicule was to better the conditions which they satirized; with others, mere bitterness underlay the writing. Lucilius was the originator of the poetical form. In the words of Dryden,

Lucilius was the man who, bravely bold, To Roman vices did the mirror hold; Protected humble goodness from reproach, Showed worth on foot, and rascals in a coach.

Although Elijah's taunts of the prophets of Baal on Mount Carmel are examples of scathing satire, Juvenal, perhaps, is called its most famous master. His biting comments on the vicious life of Rome have been imitated by a number of later poets. Aristophanes is another example, but Tacitus, Horace, and Juvenal are the three outstanding Roman representatives of this type of writing.

atives of this type of writing.

One of the greatest satirists of the world was Erasmus of Rotterdam, who attacked many evils of his day. English satire is first notably presented by William Langland in Piers Plowman, in which he railed against the clergy and the law courts. Dryden's Absalom and Achitophel and MacFlecknoe, Johnson's London, and Pope's Dunciad are among the great satircial poems in English, while Swift's Gulliver's Travels, in prose, is one of the greatest satires in any language. To these names must be added Butler and Addison, also Cowper, Byron (in Don Juan), and Burns. Among French masters of this art were Rabelais, Molière, and Voltaire; in Germany, Richter and Heine; in Spain, Cervantes; in Norway, Ibsen; in Sweden, Strindberg; and in Russia, Gogol. In the United States, Lowell, Holmes, and Mark Twain made much use of satire in their writings, but with them it had not the fierceness which often distinguished it in classic times. Haliburton, who wrote under the pen name of Sam Slick, was the foremost Canadian satirist.

SATRAP, sa' trap. See Persia (History); Darius (I).



SATURATION, sat u ra' shun. See Evapo-RATION; SOLUTION; HYGROMETER.

SATURDAY, called Saeter-daeg by the Anglo-Saxons, is the seventh day of the week. It is named for the Roman god Saturn, and is the only day named for a Roman deity. Saturday is the Sabbath day among the orthodox Jews and Adventists. In some localities, Saturday afternoon is a legal holiday, and it is

a growing custom for employers everywhere to give their workers the half holiday. There is now a growing tendency, fostered by some labor unions, to bring about a fiveday working week, thus making Saturday a full-day holiday. See Week.

SATURN, in Roman classical mythology, the youngest of the Titans and son of Uranus and Gaea (Heaven and Earth). His name was derived from sero, meaning I sow. Saturn prethe sower's labors.

Having overthrown his father, he became ruler of the universe, and was happy until the birth of his first child. Then he remembered that an oracle had declared that he should be dethroned by his child, and to prevent this disaster, he swallowed the babe. Four other children met a like fate, but when Jupiter, the sixth and last, was born, the mother concealed the babe and gave Saturn in its stead a stone, wrapped in child's clothing, which he swallowed without noticing the substitution. When Jupiter grew up, he dethroned his father and banished him to Italy, where he set up a most prosperous kingdom, teaching the people agriculture and useful arts. Every year, in December, the feast Saturnalia (which see) was held by the Romans in his honor.

In Art and Symbolism. Saturn is shown in art as an old man bent with infirmities. In his hand he holds a scythe and a serpent which bites its own tail emblems of time and of the year. He is the personification of time, and the story of his swallowing his children is but an allegorical way of saying that time creates only to destroy.

SATURN, the sixth planet in distance from the sun, and next to Jupiter in size. It was known to the ancients and marked their boundary of the solar system, for beyond it they knew of no planets. Little is definitely known about Saturn. Its average distance from the sun is 886,000,000 miles, but there is a range of 100,000,000 miles between the greatest and least distances, because of the eccentricity of its orbit. Saturn rotates on its axis in 10 hours 14 minutes, and revolves

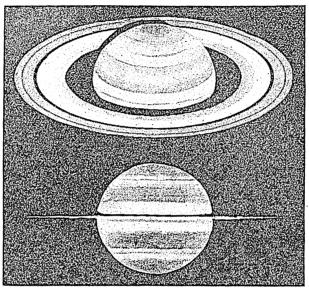
round the sun in twenty-nine and one-half years. Its surface is about eighty times that of the earth, its volume 730 times; but its density is only one-eighth the earth's density, or less than that of water. The surface temperature is about 250° below

zero, F.

Saturn appears as a big yellow star, of about the same brightness as Capella. The planet has nine, possibly ten, satellites, and is surrounded by a system of rings inside the satellites, Below, the such as do not exist anywhere else in

the solar system. Saturn's Rings. The ring system of Saturn has been the object of much speculation and study, but the use of modern instruments has enabled astronomers to determine what the rings really are. In 1610 Galileo, working with a telescope that would be despised in any modern observatory, was puzzled to notice a peculiarity in the appearance of Saturn for which he could not account. In 1656 Huyghens, a Dutch astronomer, explained the mystery of Saturn's ring, believing only one to be present. Now, however, it is known that the planet is surrounded by three concentric rings, composed of myriads of separate meteoric particles, each particle moving in its own orbit round the planet. The whole produces the effect of a gauzelike ring, resembling particles of dust in a ray of sunlight. The outer and larger ring has an exterior diameter of about 170,000 miles, and a width of probably 10,000 miles. The exterior diameter of the inner ring is about 145,000 miles. The rings are so thin that their thickness cannot be measured accurately, but it is believed to be not over ten miles.

Saturn's Satellites. The system of which Saturn is the center is enormous. The largest



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THE PLANET SATURN

sided over agricul- Above, the present telescopic aspect of Saturn. ture, and blessed the cover's labors of the ten satellites, Titan, was discovered by Huyghens in 1655. It is not visible to the naked eye, but can easily be found with the aid of a small telescope. Its distance from Saturn is about 760,000 miles, and it has a diameter of approximately 2,500 miles, its mass being about double that of our moon. Another of the satellites, Iapetus, is 2,200,000 miles from the planet, and revolves round it in about seventy-nine days. The ninth satellite has a retrograde motion. The tenth and smallest was claimed to have been discovered in 1905, but its existence has not been confirmed.

Related Subjects. For illustration of comparative sizes of Saturn and the other planets, see Planet. Other articles to which reference is suggested are ASTRONOMY; SOLAR SYSTEM; HERSCHEL (Sir William).

SATURNALIA, sat ur na' lih ah, an ancient Roman festival in honor of Saturn (which see), the god who presided over the sowing of the seed. The festival began on December 17 and, under the Caesars, lasted seven days. The first day was devoted to public religious rites, and sacrifices were offered to Saturn; on the second day was offered the usual family sacrifice, a young pig. The festival was entirely one of mirth. The schools observed holidays, no public business could be transacted, the courts of law were closed, no criminal could be punished, and banquets and family gatherings were held. The Saturnalian festivals were participated in by the slaves, who were considered free for the time, and were waited on by their masters, for no distinctions of rank were observed. The last days of the festival were devoted to visiting and giving presents. Little clay images, called sigillaria, were the principal gifts, and from the custom of giving these, the last days of the festival were called the sigillaria. The festival soon degenerated into a period of disorder and debauchery.

SATYR, sat' ur, or sa' tur, in Greek mythology, a god of the woods, who had a man's head and body, but the ears, legs, feet, and tail of a goat. At first, satyrs were sometimes represented as repulsive in appearance, animal-like in habits, and a terror to the nymphs of the wood. In later representations, they appear as graceful youths with pointed ears, goats' hoofs, and a small tail. Satyrs are associated with the worship of Bacchus, and their leader was Pan. Their counterparts in Roman mythology were the fauns.

Related Subjects. The reader is referred in these volumes to the following articles:

Fauns Mythology Pan Silenus

SAUDI ARABIA, sah oo' de, Kingdom of. See Hejaz; Nejd.

SAUERKRAUT. See CABBAGE.

SAUGUS, MASS. See MASSACHUSETTS (back of map).

SAUK, sawk, OR SAC, sak. See Indians, American (Most Important Tribes).

SAUL, sawl, son of Kish, was the first king of Israel. He ruled in the eleventh century B.C., and followed Samuel, the last of the judges. Having gathered together the armies of Israel, Saul, aided by his son Jonathan, waged successful war against encroaching tribes, especially the Philistines. The story of Saul, as told in I Samuel, is one of the most tragic of Bible history. Appearing at first as a man of heroic stature and modest manner, he soon began to show an erratic temper and uncontrolled self-will. This developed into a kind of jealous madness, dangerous alike to enemies and friends. The youthful David, who was engaged to play day by day upon the harp to quiet his ravings, became the object of his jealousy and of his bitter persecutions. So darkened did his mind finally become, that, on the last night of his life, he went disguised to the Witch of Endor, to ask the outcome of the next day's battle with the Philistines. When Saul faced defeat, on Mount Gilboa, after his sons had been killed, he fell on his sword and died. Soon afterward, the hunted David returned to reassemble the scattered armies, avenge the king's death, and succeed him.

David's noble lament for Saul, his king, and Jonathan, his friend (II Samuel, I), contains the words:

Saul and Jonathan were lovely and pleasant in their lives,

And in their death they were not divided; They were swifter than eagles, They were stronger than lions.

How are the mighty fallen in the midst of the battle! [The story of the friendship of David and Jonathan is told in these volumes in the article DAVID.]

SAUL OF TARSUS. See Paul (the Apostle). SAULT, soo, SAINTE MARIE, MICH. See MICHIGAN (back of map).

SAULT SAINTE MARIE, ONT., a Canadian city directly opposite the city of the same name in Michigan. It is situated on the Saint Mary's River, near the outlet of Lake Superior. By rail, Sault Sainte Marie is 618 miles west of Montreal, and by water, is about 870 miles from that city. Population, 25,794 (1941).

Sault Sainte Marie was settled about 1850, and was incorporated as a city in 1912.

Transportation. The city is on the Canadian Pacific and the Algoma Central & Hudson Bay railways. The latter connects with the Canadian National, the Duluth, South Shore & Atlantic, and the Soo Line.

Industry. Sault Sainte Marie has a large water commerce, chiefly in grain, iron ore, and coal. Navigation around the "Soo," or rapids, is facilitated by the various Sault Sainte Marie Canals (which see). The city is one of Ontario's manufacturing centers. Steel, coke, pulp and paper, tar, chemicals, and lumber in all forms are the leading products.

SAULT SAINTE MARIE CANALS, popularly called the Soo Canals, two artificial waterways, one in Michigan and one in Ontario, by which vessels pass between lakes Superior and Huron. The construction of the canals was made necessary by the rapids of the Saint Mary's River, which forms the natural connection between the two lakes.

canals carried more tonnage in 1939 than the Suez and Panama Canals combined. Iron ore was the leading commodity in eastbound traffic, and coal in the westbound traffic.

The American Canal. On the United States side, there was at first a tramway for the conveyance of freight and passengers around the The first rapids. canal was completed in 1855 by the state of Michi-

gan, which re-tained the ownership until 1881, when it was transferred to the United States Government. This canal had two masonry locks, each 350 feet long and with a lift of nine feet. These locks were destroyed in 1888 by the excavation for the Poe lock.

The Weitzel lock, completed in 1881 and in disuse since 1919, was replaced by the MacArthur (named for General Douglas Mac-Arthur) lock in 1943. It is 800 feet long and has thirty feet of water on the sills, which makes it the deepest of the present locks. The Poe lock, just north of the MacArthur, was completed in 1896, and was named for General Orlando M. Poe (1832-1895). It is 800 feet long, and has twenty-two feet of water on the sills. The MacArthur lock cost \$14,000,000; the Poe lock, \$2,837,337. While the Poe lock was under construction, the Canadian government completed the canal described below. For many years, the Canadian canal, being deeper, was used by the larger vessels, although the total tonnage of freight was divided almost evenly between the two canals.

In 1908 the United States Government began the widening of the old canal channel and the construction of the Davis lock, or Lock No. 3. During 1914 a new canal was excavated to the Davis lock, and the lock and canal were opened in October. The Davis lock is 1,350 feet long between the inner gates, is eighty feet wide, and it has a minimum depth of twenty-four

and one-half feet on the sills. The canal to this lock is 260 feet to 300 feet wide. The increased depth of the Davis lock permits the largest lake steamers to use the American canal, and the lock is large enough to hold two of them at one operation. The construction of the Davis lock and the new canal involved an expenditure of \$6,200,000; the widening and

deepening of the old canal cost \$4,-400,000; and improvements of the channel in the river cost \$9,400,000. In 1912 Congress authorized the construction of a fourth lock, directly north of and exactly similar to the Davis lock. This fourth, or Sabin, lock was completed after various delays due to World War I, and opened to traffic in September, distance of twenty



6400

SAULT SAINTE MARIE CANALS

(1) American canal and locks; (2) Canadian canal and locks; 1919. Ships can be (3) power canal; (4) Sault Ste. Marie, Michigan; (5) Sault Ste. raised or lowered a Marie, Ontario.

> feet in eight minutes. The machinery of the locks is operated by electricity.

The Canadian Canal. The early trappers had to carry their canoes and furs around the rapids, but in 1798 the Hudson's Bay Company completed a canal through which canoes and bateaux could ascend the river. This canal had a single lock, which was thirty-eight feet long and eight feet nine inches wide, and had a lift of nine feet. It was destroyed by American soldiers in 1814. The present Canadian canal was begun in 1888, and was completed in 1895, at a total cost of \$4,935,809. The Canadian canal is one and three-tenths miles long, 150 feet wide at the surface, and twenty-five feet deep. The lock is 900 feet long by sixty feet wide, and has a lift of eighteen feet. The canal is cut through Saint Mary's Island, on the north side of Saint Mary's River.

Related Subjects. The general article Canal should be read in connection with this article. Valuable collateral information is also contained in the articles:

Erie Canal Panama Canal Suez Canal New York State Barge Canal Welland Ship Canal

SAUNDERS, RICHARD. See Poor Rich-

SAUROPOD, saw' ro pod. See DINOSAURIA. SAUSAGE, a food preparation consisting of meat, minced and highly seasoned, and usually enclosed in a cylindrical case or skin, tied or constricted at short intervals. The term is also applied to a single section of such a preparation, closed at the ends by ligatures.

Sausages are mentioned in the oldest known work on cookery, dating from about 228 A.D. but are believed to have been made and eaten several centuries before the Christian Era, and they have been a popular article of food down through all the ages of recorded history.

Sausage meat and sausages are a leading product of the packing industry, as well as a product of the farm and the home in many countries. There are many varieties of sausage, and the meats used include pork, ham, beef, bacon, veal, chicken, or game, and, in some countries fish. The seasonings used include salt, black and red pepper, sage, garlic, sugar, ginger, mixed spices and herbs; and, in European countries, red wine is often used for coloring the meats. Some sausages, like fresh pork sausage often sold in short links about the length of a finger or in the form of patties, are marketed raw; many others are cooked or smoked, and are sold ready for the table.

Sausage meat when minced and seasoned is stuffed into casings manufactured from the intestines of domestic animals, preferably the sheep. These casings are carefully cleansed and then salted or soaked in brine.

In addition to animal casings, so-called artificial casings are used extensively in America and England. Artificial or synthetic casings were first introduced about 1916, and in 1928 the invention of a sausage casing made from cellulose materials was announced by American chemists. The cellulose casings can be manufactured in any size desired.

While many European countries, especially Germany, France, and Italy, formerly excelled in the manufacture of famous varieties of sausage, more than one hundred kinds of these European varieties are now made and sold in the United States. American sausages may be classified as fresh, smoked, or cooked sausage and dry sausage. The former class includes pork sausage, frankfurters, Bologna, liver sausage, blood sausage, blood and tongue sausage, and other special kinds. Dry sausage includes such varieties as cervelat, salami, Holsteiner, farmer sausage, and Mortadella.

Sausages are good energy foods, varying in fuel value according to composition. The raw kinds are prepared for the table by boiling, frying, or broiling. Pork sausages should always be cooked, as a precaution against the trichina (which see).

Brief descriptions of leading varieties of sausage are given below:

Arles, a sausage popular in France, with a fuel value of 2,554 calories per pound.

Black pudding, an English name corrupted from the French boudin noir, made in Scotland of hog's blood, dried oatmeal, shredded suet, and minced onions, with pepper and salt. The seasoning differs in various localities in England; in Yorkshire and Staffordshire, marjoram, pimento, mint, and thyme are used, as well as pepper and salt. In France, garlic and beetroot leaves are sometimes used. Black puddings are eaten in France on Christmas Eve, as a custom, after midnight mass.

Bologna, a large sausage made of finely chopped bacon, veal, and pork, sold ready to serve; fuel value, 1,063 calories per pound.

Bockwurst, a small sausage formerly served with bock beer.

Boudins blancs, French sausages regarded as a delicacy and grilled before serving. They are made of minced white chicken meat, yolk of eggs, onions, bread crumbs, salt and spices mixed with cream or milk, cased and boiled in milk and water. French boudins are also made of game and fish.

Boudins noirs, see Black pudding, above.

Cervelat, a dry sausage originally made of animal brains (whence the name), but now of cured pork and beef, seasoned, stuffed into casings, and sold ready to eat. Some varieties are smoked. The English call such sausages saveloys, which is a corruption of cervelat, and they are highly popular in London, where they are sold in the streets.

Frankfort, a German sausage which has developed into the popular frankfurter of the United States, nicknamed "red hot." Similar sausages are made in former Austria and called Vienna sausage, hence the wienerwurst of American delicatessens. They are small sausages of pork and beef, cured, well smoked, and are eaten hot. The fuel value is 1,034 calories.

Holsteiner, made of about equal parts of pork and beef, chopped coarse, stuffed into ring-shaped casings.

Leberwürst, or liver sausage, is made from parboiled liver grated and seasoned, and is sold either fresh or smoked, ready to eat. It is much used in both Europe and America. The Scots make a liver pudding with oatmeal and onions. See White pudding.

Lyons, a French sausage made of pure ham. Metwürst, a popular German sausage.

Moriadella, a famous Italian sausage, originally made of pork from forest pigs that feed on chestnuts and acorns, and flavored with wine, garlic, and spices.

Pork, the popular link sausage of the American farm and the urban home, sold fresh and cooked by frying or broiling.

Salami, a dry sausage, usually made in Europe of pork, beef, and bacon, highly seasoned, and colored with red wine. Several kinds of salami are made in America, where it is popular.

Saveloy, see Cervelat, above.

Tongue, a cooked sausage made of beef or other animal tongues, with various seasonings.

White pudding, a Scottish sausage made of beef suet minced and mixed with toasted oatmeal, seasoned with salt and pepper, stuffed into a casing, and boiled. See Black pudding, above.

Wienerwurst, see Frankfort, above.

SAVAGERY. See CIVILIZATION.

SAVAII, sah vi'e, ISLAND. See SAMOA. SAVANNA, sah van' ah, a large tract of

SAVANNA, san van an, a large tract of land covered with vegetation which consists chiefly of tall, stiff grasses growing in dense tufts, and low trees irregularly distributed. The name is of American Indian origin. The pampas of South America, the prairies of

Central North America, the steppes of Europe, and the plains of Central Africa are all savannas, varying somewhat in character of vegetation. Most of these plains furnish excellent grazing districts for cattle. The savannas of Central Africa are the homes of immense numbers of large animals, the "big game" of the world, and the prairies of America are rich agricultural regions.

Related Subjects. The terms pampas, steppes, and prairie are described in these volumes in separate articles.

SAVANNAH (steamship), the first vessel to cross the Atlantic Ocean under power of steam. In 1936, President Roosevelt proclaimed May 20 as National Maritime Day to commemmorate this event. See also Ship.

SAVANNAH, GA., a port of entry, second city in the state in population, and the county seat of Chatham County. It is situated on the right bank of the Savannah River, about eighteen miles from the Atlantic Ocean, and approximately 100 miles north of the Florida state line. Savannah is 844 miles south of New York City, and 699 miles northeast of New Orleans. The city has coastwise steamer service to Baltimore, Philadelphia, New York, and Boston, and trans-Atlantic connection with various European ports. Population, 95,996 (1040).

General Description. Savannah is known as "the Forest City," on account of the large number of beautiful shade trees which line its wide streets and boulevards. The city occupies an area of seven square miles, and owes its regular form to its founder, James Edward Oglethorpe, who laid out the place in 1733. Savannah is rich in historical associations, and is noted for the beauty of its parks and squares, which cover 182 acres. Among the largest of the forty-two parks and squares are Daffin, Colonial, and Forsyth. Forsyth Park, on Gaston Street, contains beautiful tropical flora. Bay Street is the chief commercial street of the city, and Bull Street the most fashionable promenade. There are many handsome residences in typical Southern architecture.

Transportation. Savannah is served by six trunkline railroads: the Central of Georgia, the Seaboard Air Line, the Atlantic Coast Line, the Southern, the Savannah & Atlanta, and the Savannah & Statesboro. The harbor has permanent seacoast defenses, and there are berthing facilities for 100 ocean-going ships. Many of the great wharves and piers on the three miles of water front are occupied by railway terminals. A thirty-foot channel connects the Atlantic ocean and the city (see Savannah River). The million-dollar road to Tybee Beach, and the bridge over the Savannah River between Savannah and South Carolina, are vital additions to the commerce and trade of the city.

Industry and Commerce. Savannah has one of the largest cottonseed-oil refineries in the country, and also a large sugar refinery, which produces about 2,500,000 pounds of refined sugar every twenty-four hours. The city is first among the world markets for naval stores, and is a leading center for the manufacture of commercial fertilizers. Other outstanding products are lumber, rosin, turpentine, cotton and cottonseed-oil products, paper and pulp, soft drinks, peanuts, flour, overalls, lumber, mattresses, paints, and steel products.

Institutions. The Telfair Academy of Arts and Sciences was opened in 1885, and contains valuable collections. Hodgson Hall is the home of the Georgia Historical and the Library societies. The Chatham Academy was chartered in 1788. Savannah is the see of a Roman Catholic and of a Protestant Episcopal bishop. Christ Church is the oldest of the city's churches, its first edifice having been built in 1740. John Wesley, its third rector, is said to have established a Sunday school here nearly fifty years before Robert Raikes (which see) established one in Eng. land. The school is still in existence. Other institutions, in or near the city, are the Bethesda Orphan Asylum, founded by George Whitefield in 1740, the Georgia Industrial College for negroes, and the convent of Saint Vincent de Paul.

Early History. Savannah was founded by James Edward Oglethorpe in February, 1733. Among the early inhabitants were John and Charles Wesley. The founder of Methodism preached his first American sermon in this city. The city was the capital of Georgia until its capture by the British, in 1778, when the seat of government was transferred to Augusta. Savannah was incorporated as a city in 1789. The first steamship to cross the Atlantic, the Savannah, sailed from this port to Liverpool in 1819, taking twenty-five days for the voyage. Savannah was the objective of General W. T. Sherman in his famous "march to the sea," and was captured in December, 1864.

[For a view in the city of Savannah, see the article Georgia, page 2757.]

SAVANNAH RIVER, a waterway which forms a considerable part of the boundary between Georgia and South Carolina. The main stream is formed by the junction of the Tugaloo and the Seneca rivers, which rise near the southern boundary of North Carolina and unite on the Georgia-South Carolina boundary, a few miles southwest of Anderson, S. C. From this point, the river flows in a southeasterly direction, emptying into the Atlantic through Tybee Sound, about 450 miles from the source of the main stream. A channel that is thirty feet deep has been cut from the ocean to the city of Savannah, a distance of eighteen miles, for the use of large vessels (see SAVANNAH). Smaller vessels can ascend the river 230 miles, as far as Augusta, Ga., a city of cotton mills. See South Carolina (Rivers).

SAVE, sahv, OR SAVA, RIVER, a Danube tributary, which rises in the Carnic Alps, the southern boundary of Carinthia, a province of Ostmark, and continues in a southeasterly direction for 450 miles through Yugoslavia to the city of Belgrade, where it joins the main stream (see map of Europe). It is navigable

for steamers for over three fourths of its course, though occasional shallow places, shifting sand banks, and a varying current offer difficulties to navigation. The principal tributaries of the Save are the Kulpa, the Unna, the Vrbas, the Drina, and the Bosna. The Drave, another tributary of the Danube, and the Save flow in courses almost parallel.

SAVIN, sav' in. See JUNIPER.

SAVINGS BANKS. See BANKS AND BANK-ING, subhead.

SAVINKOV, Boris. See Rus-

SIAN LITERATURE. SAVONARO-LA, sav o nah ro'lah, GIROLAMO (1452-1498), an Ìtalian friar, one of the first martyrs in the Reformation movement, was born at Ferrara. He belonged to the nobility. and in vouth became familiar with medieval learning. It is thought that an unhappy love affair caused him to discontinue his secular (medical) studies and become a monk.

Having joined the Dominican Order at Bologna, in 1475, he gave himself up to the severest kind of penance and humility.

In 1482 Savonarola began to preach—fiery, spontaneous outbursts of indignation against

the wickedness of the world. He went from Ferrara to Florence, then to Brescia, and again, in 1490, back to Florence. In the following year, he was elected prior of Saint Mark's. His sermons were impassioned denunciations of existing conditions in both Church and State, although, as shown by his own writings, he never wavered in his



SAVONAROLA

allegiance to the Roman Church. Lorenzo de' Medici, of the reigning house (for Florence was not at this time a democratic republic), unsuccessfully tried to win over Savonarola to his side, and the story has come down that Savona-

rola refused to grant absolution to Lorenzo while the latter was dying. Thereafter, the Piagnoni, or democratic party, came into power, and Savonarola was greatly strengthened by their fervent support. The invasion of Charles VIII of France added to the confusion, and hastened the destruction of the Medici.

A great change swept over the pleasure-loving city of Florence while Savonarola, as dictator, swayed the emotions of the people by

his fervent puritanical exhortations. He expected too much, however, of the Florentines; their ardor cooled, and, wearying of virtue, they deserted their leader. Pope Alexander VI had not escaped the reformer's bitter attacks, and, fearful of his increasing power, decided to excommunicate him. Savonarola declared the sentence null and void, but the Florentines were impressed by the terrifying ceremonial.

A Franciscan friar challenged Savonarola to prove the truth of his teachings by an ordeal by fire; this was undertaken, but the experiment was not carried out, as a heavy rain quenched the flame while they were still wrangling over preliminaries. The zealous monk's life was then in constant danger. The infuriated mob had been deprived of an exciting spectacle, and demanded his arrest and trial for heresy. In prison he was tortured to such an extent that he became physically incapable of resisting attacks. With two fellow victims, he was finally executed by a slow and tortuous process, to the very end refusing to recant. A small tablet, in Florence, marks the place of execution.

Mystical, given to dreams and visions, enthusiastic and too zealous to be a good judge of what the Florentines would be ready to accept, Savonarola suffered a martyr's death, but it was a death ennobled by high ideals and unswerving devotion to his chosen work. His final words on the scaffold, in reply to the bishop's formula, "I separate thee from the Church militant and the Church triumphant," were as follows: "Not from the Church triumphant; that is beyond thy power." Savonarola's life is told in George Eliot's Romola.



AN ORATOR OF GREAT POWER

In the illustration, Savonarola is shown preaching against the vices of his time.

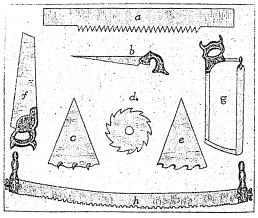
Related Subjects. The following articles in these volumes contain information which will be of interest in connection with this study of Savonarola:

Charles (VIII, France)
Dominicans
Florence
Medici (Lorenzo de')

Ordeal and Combat, Trial by Reformation Torture

SAVOY, sah voi', House of, the oldest reigning European dynasty, to which all the kings of United Italy have belonged. The house was founded by Humbert, first Count of Savoy, who flourished between 1003 and 1056. See ITALY (History of Italy).

SAW, a cutting tool consisting of a metal blade, one edge having teeth set at slight angles to enable them to cut through wood, stone,



VARIOUS SAWS

(a) Gang-saw blade;
(b) compass saw;
(c) section of inserted-tooth circular saw;
(d) circular grooving saw;
(e) section of chisel-tooth circular saw;
(f) handsaw;
(g) meat saw;
(h) crosscut felling saw.

or metal. There are many kinds of saws, each designed to meet certain requirements.

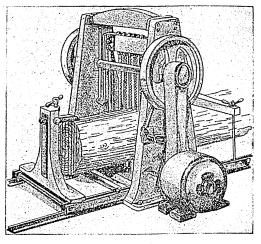
A circular saw consists of a circular plate of tempered steel, armed with teeth. This saw is now used in most lumber mills of average size. The saw is often as large as seven feet in diameter, is revolved by machinery, the power being supplied by steam, electricity, water, or gasoline, and is capable of sawing through 200 feet of wood, board measure, per minute. Circular saws are now made to cut disc-shaped pieces of wood, as well as straight flooring boards and building material. This type of saw was patented in England, in 1777, by Samuel Miller.

Band saws consist of bands of steel with teeth, the band being passed over and operated by pulleys. This saw is extensively used for making barrel staves and many of the thinner parts of furniture. The band saw and the circular saw are both stationary, the wood being placed on a table and pressed against the cutting edge. The band saw was invented in 1808 by an Englishman, William Newbury.

A crosscut saw, chiefly used in cutting logs, is about eight feet long, and is provided with teeth which cut in the backward, as well as the forward, motion of the saw. The blade has a handle at each end, and the saw is operated by two men who alternately pull the saw across the surface of the wood. No pressure is applied, the weight of the saw being sufficient to enable it to cut through the hardest woods.

Butchers' and machinists' saws, which are made of tempered steel, have very narrow blades with fine teeth. A wood saw has a narrow blade, mounted on a frame of light but strong wood. These operate on the principle of the crosscut saw, but are short and are operated by one man. The common saw used by carpenters is known as a handsaw.

Gang saws consist of a dozen or more saws placed parallel to one another at equal distances apart. Such saws cut a vast amount of lumber, reducing the roughly squared timber of an entire log to boards of the required thickness in one operation. The saws are set as far apart as the thickness of the boards to



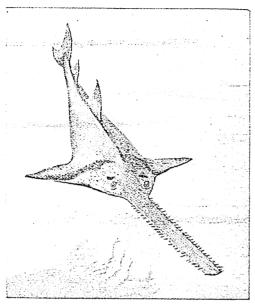
ONE FORM OF GANG SAW

be cut, and the sliding frame on which the logs are placed is moved forward against the saws. The productive power of gang saws is almost unlimited.

SAWBILL. See MERGANSER.

SAWFISH, a family of fish, probably transitional between the sharks and the rays. Their chief characteristic is the possession of a flat, swordlike snout, which is used as a weapon of offense and defense. Each side of the "saw" is provided with a series of sharp teeth, and with it a sawfish viciously tears open the bodies of its victims, which are said to include such large marine animals as whales. Shoals of small fishes suffer particularly from attacks of sawfish, and they have been known to drive the saw through the hulls of ships.

There are five species, distributed through the warm parts of the ocean. They are large fish, some of the saws being six feet long and a foot wide at the base. An American species, common in the coast waters of the Southern



THE SAWFISH

United States, grows to be fifteen feet long, including the saw. It makes its way up the Mississippi River for many miles from its mouth, and does considerable damage to fishermen's nets. The sawfish belong to the family *Pristidae*.

SAW PALMETTO, a palm of the Southern United States coast. See PALMETTO.

SAWTOOTH RANGE. See IDAHO (Physical Features).

SAX, JOSEPH AND ADOLPHE. See BAND; SAX-OPHONE.

SAXE, sax, John Godfrey (1816-1887), an American humorous and satirical poet. He was born at Highgate, Vt., educated at Middlebury College, and admitted to the bar. He served as attorney-general and as editor of a Burlington, Vt., newspaper, before going to Albany, N. Y., where he edited the Evening Journal and became well known through his writings and lectures. Saxe ranks high as a humorist, and his verse is somewhat attractive.

Saxe's Works. Among his publications are The Money-King and Other Poems, Leisure-Day Rhymes, and Fables and Legends of Many Countries.

SAXE, MAURICE, COUNT DE (1696-1750), German-born Marshal of France. Famous for his brilliant generalship during the War of the Austrian Succession, his important victories included Prague in 1741; Fontenoy in 1745; and Maastricht in 1748. See Succession Wars.

SAXE-COBURG-GOTHA, sahks ko' boorK-go' tah. See Windsor, House and Family of.

SAXIFRAGE. The plants which bear this name grow in stony soil or from clefts in rocks, and are so called because of the unfounded belief that they cause rocks to disintegrate. Saxifrage is from Latin words meaning stonebreaking. The species, for the most part, are found in cold and temperate regions of the northern hemisphere. The leaves of some of the European forms are eaten as salad, and the root is used medicinally. These hardy plants have stalks from one to two feet high, while the foliage varies, being mossy, leatheryleaved, or silvery. The many tiny seeds are enclosed in little capsules, and the blossoms are of all colors. Some of the species are grown for ornamental purposes, especially in rock gardens. Among these is the early saxifrage, a plant with small white flowers and brownishpurple fruits.

Scientific Names. These plants belong to the family Saxifragaceae. The early saxifrage is Saxifraga virginiensis.

SAXONS, a Germanic people who took part in the invasions of the island of Britain in the fifth and sixth centuries, contributing, with the Angles, to the founding of the English kingdom. The Saxons first appear in historical records in a book written by Ptolemy in the second century. They seem then to have occupied the land corresponding to Schleswig (Denmark's peninsula). During the reigns of Julian and Valentinian, they invaded Roman territory, and by the sixth century, had spread over Northwestern Germany as far east as the Elbe River. The Saxons who remained in Germany were subjugated by Charlemagne, who forced them to accept Christianity and made their country a part of his empire. During the ninth century, a Saxon duchy was established, but this passed out of existence after three centuries. The name Saxony, which was originally applied to the home of the Saxons, came in time to be the designation of a kingdom in the German Empire; after 1918 this was a state of the new German republic.

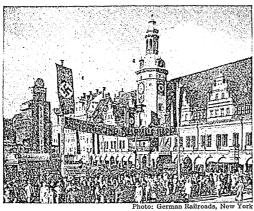
Related Subjects. The reader is referred to:
Anglo-Saxons England (History)
Charlemagne Saxony

SAXONY, sak' sun e, OR SACHSEN, zahk'-sen, an administrative area in Germany, situated almost centrally, with Prussia on the west, north, and east, Thuringia on the west, Bavaria on the southwest, and Sudetenland on the south. Its area, which is 5,787 square miles, make it the eighth state in the Reich in size, and in population (5,206,861 in 1939) it is fourth. In Saxony there are about 900 people to the square mile, the density of population making it fourth among the other German states. See GERMANY (map).

6406

The People and the Land. The majority of the people are of pure Teutonic stock; included in the population are a small proportion of Germanized Slavs and a number of Wends. In religion the people are predominantly Protestant, and of the Lutheran denomination. Educationally, the state is one of the most important in Germany. Leipzig has a great university and a famous music school, and Dresden is noted as an art, musical, and literary center.

Saxony is in the central mountain region of Germany, and though, above Dresden and along the Elbe, there are mountains and



LEIPZIG TRADE FAIR, IN SAXONY A scene during Fair time on Market Square in front of City Hall, built in 1556.

scenery which rival those of Switzerland, the land is hilly rather than mountainous. country is traversed by the Elbe River, the only stream of any great commercial importance. It is navigable for about seventy-two miles through the state. There are many mineral springs, popular as health resorts. Bad Elster is one of the most famous. The climate is mild and agreeable, with an abundance of rainfall, and the soil is fertile.

Agriculture is highly developed, though the farms are small; the main products are wheat, rye, barley, oats, potatoes, and hay. Orchards, vineyards, and flax fields also flourish. Among mineral products, silver, coal, iron, lead, tin, marble, and precious stones are important. The forests offer other valuable resources, and about one-fourth the total area is covered with timber.

However, manufactures and mining occupy the first places in the interests of Saxony. Besides the prosperous textile factories, Saxony has large establishments producing furniture, paper, watches, glassware, pianos, machinery, and many other commodities. At Meissen is the famous porcelain factory where Dresden china is produced. In proportion to its size, the state is the busiest industrial section of

Germany. It holds first rank in the production of textiles, and contains some of the most important centers of iron manufacture. chief imports are corn, wine, salt, cotton, silk, flax, and tea and coffee.

Government and History. According to the constitution adopted in the fall of 1920, a legislature of one chamber, called the diet (landtag), was provided, with members elected by the people, who possessed the power of initiative and referendum. Under the Nazi regime, the Constitution was set aside, and the diet and popular government were both abolished. On April 7, 1933, the State was placed under the absolute rule of a Statthalter, or Governor, the personal representative of Chancellor Hitler.

The name Saxony was originally applied to a large section in Northwestern Germany inhabited by the Saxons (which see), and this territory was quite distinct from the modern kingdom. It was late in the Middle Ages before the name was applied to the territory in the east of Germany from which the modern Saxony developed. Before the Thirty Years' War, Saxony was the leading Protestant state in Germany, but Brandenburg soon eclipsed it. The present limits of Saxony were defined in 1814 by the Congress of Vienna, after the defeat of Napoleon at Leipzig. Saxony joined the North German Confederation at the close of the Seven Weeks' War (which see), in which it was allied with Austria against Prussia, and in 1871 it became a member of the German Empire [see Germany The War of the Austrian Suc-(History)]. cession and the Seven Years' War exhausted the country, and it was a long time before the people were able to regain their former prosperity.

In the decade before World War I, there were political and constitutional difficulties in Saxony, in which reform of the upper house was sought, in order to break the agrarian predominance and give proper representation to commerce, industry, and handicrafts. Be-fore any changes could be made, the state was involved in World War I, from which the people of Saxony suffered particularly, owing to their inland position and lack of food. Parliamentary conflicts continued until the beginning of the revolution, on November 9, 1918, and on November 10 a republic was proclaimed. Socialists threatened to take over the government, and various disturbances and demonstrations were common throughout the country. In April, 1919, the workers proclaimed a Soviet Republic in Leipzig, but it was dissolved within a month. The new constitution described above was adopted the following year, and, except for minor political troubles, the state has been able to resume its position as a leading industrial state in Ger-

many.

[Saxony is also the name given to a province in Prussia. The Grand Duchy of Saxony (also called Saxe-Weimar), formerly a state of the German Empire, united with Thuringia in 1918 to form a federated state.]

Related Subjects. The reader is referred to the article on Germany for additional material. Dresden, the capital, and Leipzig, the leading industrial and educational center, are described in these volumes under their titles. For Chemnitz, see Germany (Cities). See, also, Seven Years' War; Succession) Wars (The War of the Austrian Succession).

SAXOPHONE, sak' so fohn, a deep-toned brass musical instrument, which has become extremely popular since the introduction of "jazz" music. Its name comes from that of Adolphe Sax, who invented it in 1840. The in-

strument is a conical tube. curved upward at the bottom and having a smallpartturned backward at the top, where the mouthpiece and a reed like that of the clarinet are fitted. Twenty keys are arranged on its uncurved length. which are manipulated by the first three fingers of each hand. Saxophone music is written in the treble clef, and the instrument can be played without difficulty by anyone who has mastered the flute or clarinet.



A SAXOPHONE

As a solo instrument, or for band or orchestra, the saxophone is in great demand by professional entertainers. See Band; Orchestra.

SAYWARD CASE. See TAFT, WILLIAM HOWARD.

SCABIES, or MANGE (which see). See also ITCH.

SCABIOSA, skay bih o' sah. See Fleabane. SCAFELL, skaw fel', PIKE, the highest point of land in England. See England (Highlands and Lowlands).

SCALDS. See BURNS AND SCALDS.

SCALE, in music, a regular succession of notes arranged in alphabetical order from a given note. The simplest series is the octave of eight notes, or the *major scale*, which contains five whole steps and two half-steps, the latter between three and four (E and F, or *mi*

and fa) and seven and eight (B and C, or ti and do). This scale does not make use of all the tones within the octave, for if all the half-steps are counted, the octave will be seen to contain twelve tones. A scale containing all of these twelve tones is said to be *chromatic*. Another term often used in connection with scale is *minor*; by minor scale, we mean one which begins on the sixth tone of the major, or la.

Related Subjects. These various points are discussed in these volumes in the article MUSIC, under the subheads A Lesson on the Major Scale, How to Remember Scales, A Lesson on the Chromatic Scale, and A Lesson on the Minor Scale.

SCALE, a machine for weighing articles. See Weighing Scale.

SCALE INSECT, OR BARK LOUSE, one of a family of insects including several species that are very destructive to fruit plants. They are so called because they secrete scales consisting of cast skin and excreted matter. These scales, which form a body covering, are sometimes white and powdery, and sometimes glassy or shell-like. The scale insects injure plants by sucking the sap. Of the 2,000 or more known species, nearly 400 are found in America, but in many instances they are not recognized as insects by fruit-growers, because they are so unlike the typical members of that class. The small black or brown spots sometimes seen on oranges are scale insects, and there is one species in which the females resemble small oak

Probably the best-known of the group is the San Jose scale of California. This scale belongs to the most pernicious division of the family, the adult females of which are decidedly a degenerate type of insect. That is, they remain motionless during the greater part of their existence, and are lacking in legs, wings, eyes, or feelers. Other common American scales are the cottony cushion and the cottony maple scales, the scurfy bark louse, the pine-leaf and the rose scales, and the mealy bug. A small ladybird, imported from Australia, has been used to check the cottony cushion scale bug. Cochineal and lac are commercial substances produced by insects of this family.

Classification. Scale insects form the family Coccidae in the order Hemiptera (which see).

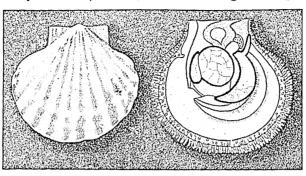
Related Subjects. For further information relating to this subject, the reader is referred in these volumes to the following articles:

Cochineal Insect Insecticides and Fungicides Lac Mealy Bug San Jose Scale Zoölogy (How Zoölogy Affects Human Welfare)

SCALES, the thin, flat plates which form the outer covering of most fishes and of many serpents and lizards. Those of the reptiles are hardened folds of the epidermis, whereas, with most bony fishes, the scales are developed from the under skin. A few mammals are also scalecovered, such as the scaly ant-eater. Scales consist usually of a horny substance, and they

overlap one another like shingles, forming a protective armor for the softer body; they vary in size, shape, and arrangement, according to the size and kind of animal they cover. The wings of butterflies and moths are covered with scales so tiny that they appear like specks of down.

In botany, scales are little, flaky leaves which cover buds on trees and woody plants in cold and temperate climates, to shield them from sudden changes



SCALLOP AND OCCUPANT

The dark lines enclose the edible part.

Photo: Visual Education Service

SCALLOPS

(1) Outer and inner surface. (2) Upper and lower surface. (3) Upper surface of a plainer specimen.

in temperature. The regular sections of fir cones have the same name. See, also, SCALE INSECT.

SCALLOP, skahl' up, a bivalve shellfish related to the oysters. The two valves of the shell covering are shaped like fans, and in

some species they are marked with prominent ridges which radiate from the hinge. The shell ends in an earlike extension. in which the hinge is placed. Along the margin of each mantle fold (the membrane lining the shell) are a row of slender tentacles and a fringe of bright-blue eyes. Adult scallops have

a rudimentary foot with which they plow through the mud. In swimming, the animal opens the valves quickly, catching a quantity of water between the mantle folds, and then closing its shell. Because of pressure within, the water is forced out in jets through round openings on the hinge, and the resulting movement against the water outside pushes the animal along in a zigzag fashion, with the broad end of the body forward.

Two species of scallop are found along the Atlantic shores of North America—the common scallop, abundant in bays and inlets from the Gulf of Mexico to Massachusetts Bay, and the great scallop, occurring north of Vineyard Sound, especially along the coasts of Maine, Nova Scotia, Labrador, and in the Gulf of Saint Lawrence. The latter is the larger of the two, sometimes growing to be four or five inches wide. The only part of these animals sold as food is the adductor muscle, which the scallops use to open and close their valves. This muscle tastes like lobster meat, and is considered a great delicacy, as it is soft and tender. Scallops are caught in great numbers along the coasts of New England. Their shells are "planted" in oyster beds, to provide lodging places for oyster spat.

In the Middle Ages, pilgrims to the Holy Land wore in their hats a scallop shell as a token of their pilgrimage. See Mollusks. S.H.S.

Scientific Names. Scallops belong to the family *Pectinidae*. The common scallop of North America is *Pecten irradians*. The great scallop is *P. tenuicostatus*.

SCALP, the outer covering of the skull. It is composed of thick skin, and is closely attached to the muscular tissue by which scalp movements are made.

The thickness of the skin and its movability are important for the protection of the cranium. The thick skin is well adapted for protection from blows upon the head. The looseness of the skin prevents any wound which might occur in that region from gaping widely, and

thus encouraging infection.

It is on the scalp that the hair grows most abundantly, and the hygiene of the scalp is closely related to that of the hair. Injuries to the scalp should be treated with scrupulous care, to prevent infection; neglect may result in meningitis and other diseases. In Indian warfare, it was customary to cut off from the head of a victim a circular piece of skin and hair, about four inches in diameter; this custom was known as scalping, and the detached portion, which a brave would proudly display as a trophy of war, was called a scalp. The Indians always wore a scalp lock, or long tuft of hair, as a challenge to their enemies. K.A.E.

Related Subjects. The reader is referred in these volumes to the following articles:

Baldness Dandruff Hair (Care of the Hair)

SCAMMONY, skam' o nie, a twining, climbing plant, native to Asia Minor, having white flowers and thick, fleshy roots, usually two or three feet in length. From the roots is obtained a milky, white juice, which, upon drying and hardening in the air, forms a gum resin of medicinal value. It is used in laxative preparations, as the resin is a powerful cathartic.

B.M.D.

Scientific Name. Scammony belongs to the morning-glory family, Contolvulaceae. Its botanical name is Contolvulus scammonia.

SCANDERBEG, skan' dur beg, III. See Zog I.

SCANDINAVIA, the name given in a restricted sense to the peninsula of Norway and Sweden, but more broadly used to designate the lands inhabited by Scandinavian people, Denmark, Iceland, Norway, and Sweden. The word Scandia originated with the Romans, who used it to describe a large island believed to be north of the Baltic Sea. The southernmost portion of Sweden is still known as Scandia; that it was connected with the mainland at the north was not known in Roman days.

Related Subjects. The reader is referred in these volumes to the following articles:

Denmark Iceland Normay Sweden

SCANDIUM, skan' dik um. See CHEM-ISTRY (The Elements).

SCAPA FLOW. See ORKNEY ISLANDS. SCAPEGOAT, one of two goats received by the Jewish high priest on the Day of Atonement, upon which he cast lots, one for Jehovah and one for Azazel (Levilicus KVI, S-10). The first was killed as a sin offering, and upon the second, or scapegoat, the priest laid his hands, confessing over him the people's sins and then sending him into the wilderness as a token

that the sins had been put away. The original significance of "Azazel" has been lost, but it doubtless refers to the spirit of evil.

Modern Usage. In current speech, a person made to bear the blame of others is called a scapegoat.

SCAPULA, skap' u lah, in anatomy, the shoulder blade. See BICEPS.

SCARAB, skair' ab, a beetle venerated by the ancient Egyptians. The scarab belongs to the subfamily of dung beetles. These beetles have the peculiar habit of breeding in refuse, which they sometimes roll into small pellets and carry to their underground burrows, to be used as food. Sometimes eggs are laid in the pellets. The Egyptians regarded the pellets as symbols of the world, and projections on the heads of the beetles were considered emblems of the rays of the sun. The scarab was also a symbol of the resurrection and of immortality, and figures of the insects were carved out of stone or metal and used as charms. Such devices were called scarabs. Usually the heart of a deceased person was removed, and in its place was put a large

Classification. Dung beetles belong to the large family Scarabacidae. Tumblebugs, June bugs, and Hercules beetles are other members of the family.

Related Subjects. For supplementary information in these volumes, the reader is referred to the following articles:

Beetle Insect Hercules Beetle June Buz

SCARIFICATION, skair ih fih ka' shun. See Tattooing.

SCARLATINA, skahr lah te' nah. See SCARLET FEVER.

SCARLATTI, skahr lahi' te, Alessandro. See Opera.

SCARLET FEVER, an acute infectious disease to which children, especially those between the ages of two and ten, are particularly susceptible. The highest death rate is among children under five, and the disease grows progressively less severe after that age. Though not so contagious as measles, scarlet fever is sufficiently so to warrant vigilance in its prevention; its after effects are always a source of danger to children. Scarlatina is another term for the disease. It is not, as is sometimes stated, a name for mild cases.

Transmission and Symptoms. The specific organism that causes scarlet fever is contained in the ear, nose, and throat secretions of patients. The germs are transmitted by direct contact, by the handling of articles soiled by the discharges, and sometimes through polluted milk. The onset is sudden. An attack begins with vomiting, headache, fever, and sore throat, and within twenty-four to forty-eight hours later, a rash appears on the neck and chest. The eruption begins as tiny

red spots, which soon are spread over the body. A characteristic sign of scarlet fever is the appearance of the tongue, which is described as strawberry-like. When an attack runs its course, the rash usually starts to fade in three or four days, and is entirely gone in seven or eight. Peeling then starts, and continues for two or three weeks. The scales are not ordinarily a source of infection. They become so only if they carry the causal organisms.

Treatment and Prevention. The throat is the organ which must be watched and treated with the greatest care. A victim of this disease should be isolated immediately after the attack begins, placed in a quiet, well-ventilated room, and put on a liquid diet. The physician in charge will prescribe measures to control the fever and give directions as to bathing and the use of antiseptic sprays for the throat.

In the control of scarlet fever, the world owes much to Doctors George F. and Gladys Henry Dick, of Chicago. They proved that the causal organism is a blood-destroying bacterium of the streptococcus type (see BACTERIA AND BACTERIOLOGY), and succeeded in procuring the toxin of the germ by filtration. By inoculating a horse with the poisonous material, they produced an antitoxin that is having good results in checking the disease. Dr. Dochez of Columbia and Dr. Blake of Yale have also devised a method of procuring antitoxin. By means of inoculations with the scarlet-fever toxin, the Dicks performed a skin test which indicates whether or not a person is liable to develop the disease if exposed to it. The Dick test is similar to the Schick test employed in diphtheria (which see).

Among the dangers connected with scarlet fever are ear and eye complications, resulting in impaired hearing and sight. In some cases, the poison of the disease affects the brain and causes nervous prostration. The heart and kidneys are other organs frequently affected. As discharges from the nose, throat, and ears are carriers of scarlet fever, the strictest precautions must be taken to prevent its spreading. All secretions must be destroyed, and bedding and wearing apparel thoroughly disinfected. A scarlet-fever patient should be isolated until all discharging ceases. The Dicks and other experimenters are working to perfect a method of inoculation that will confer immunity on persons known to be susceptible to scarlet fever. Scarlet fever is still rather prevalent. However, it has become a fairly mild disease. The death rate from it is not high.

SCARLET HAW. See HAWTHORN.

SCARLET HORSESHOE, one of the geraniums (see Geranium).

SCARLET LETTER, a famous novel by Nathaniel Hawthorne, considered by critics to be one of the finest and loftiest examples of fiction in American literature. It was published in 1850, and was the first of the author's long novels—possibly his masterpiece. The scene is laid in a colonial village of Massachusetts, and the story has a background of Puritan intolerance. Written in that clear and flowing style which was one of Hawthorne's best literary traits, it reveals the spiritual effect, on two characters, of sin concealed and sin revealed. These characters, the Reverend Arthur Dimmesdale and Hester Prynne, are the hero and the heroine. A bright element in this somewhat austere book is the occasional appearance in the narrative of little Pearl, the child of Arthur and Hester.

The novel is universally admired for its fine descriptions and faithful and sympathetic delineation of character, and for the masterly way in which it points a great moral. At the same time, it is absolutely free from any trace of "preaching." The title refers to a scarlet letter A, worn by Hester on her dress, as a badge of her sin. One of Richard Mansfield's best characterizations was his portrayal of the minister in a dramatization of the novel. See HAWTHORNE, NATHANIEL.

SCAUP, skawp, OR BLUEBILL. See DUCK. SCHEELITE, sheel' ite, an ore of calcium and

tungsten. See Tungsten.

SCHELDT, skell; OR SCHELDE, sKel' de, RIVER, one of the most important commercial waterways of Europe, and especially of Belgium. It rises in the northern part of France in the department of Aisne, entering Belgium near Bleharies. In Belgium it follows a northeasterly course until it reaches Antwerp, below which it separates into two channels, the East and West Scheldt. These form a double estuary, which flows into the North Sea. The river is 250 miles in length, and has been made navigable for about 210 miles by means of locks. It is connected by canals with the chief cities of France and Belgium.

For two centuries, the Dutch exercised the right to close the Scheldt to navigation. When, in 1830, the treaty of separation between Belgium and Holland was drawn up, Holland obtained the assent of the powers to its right to fix a toll on the Scheldt. Belgium succeeded in 1863 in getting free navigation on the river. During World War I, Holland closed the mouth of the Scheldt, an action which led Belgium to initiate claims against Holland at the Versailles Peace Conference. The question was settled in 1925 by a treaty between the two countries. During the German invasion of Belgium and The Netherlands in 1940, heavy fighting occurred along the Scheldt and the Albert Canal, which connects the Meuse and the Scheldt See Belgium (Rivers).

SCHENECTADY, skeh nek' tah de, N. Y., the county seat of Schenectady County, in

the east-central part of the state, fifteen miles northwest of Albany, 159 miles north of New York City, and 215 miles west of Boston. The city is an important junction point on various commercial air routes, and contains the principal plant of the General Electric Company and the works of the American Locomotive Company. For this reason, Schenectady is often referred to as the city that "lights and hauls the world." Population, 87,549 (Federal census of 1940).

General Description. Schenectady is delightfully located among five famous mountain ranges—the Adirondacks to the north, the Green Mountains and Berkshires to the east, and the Catskills and Helderbergs to the south, all within a journey of an hour or two by train or automobile. The picturesque Mohawk River flows along the eastern side of Schenectady, and was first a link of the old Erie Canal system which has now become a part of the greater New York State Barge Canal.

Streets, Parks, and Homes. Broad, wellpaved streets are found on every side, and are shaded by old elms and maples. Among these may be mentioned State, Broadway, Nott Terrace, Erie Boulevard, Union, Brandywine, and McClellan streets. There are thirteen parks, the largest of which—Central Park—contains 156 acres, with Iroquois Lake lying within its boundaries. Aside from the parks, thirty-seven recreation grounds are maintained by the city. The handsome residences are of modern architecture, but quaint old Dutch homesteads are still to be seen in some sections of the city. Adjacent to Schenectady on the east is Scotia, a charming home community, which is connected with the city by the Great Western Gateway Bridge across the Mohawk River. Scotia is directly connected with Saratoga Springs and its celebrated race track, twentyfive miles to the north, and with Lake George and Saranac Lake.

Higher Education. Nonsectarian Union College is located on a beautiful campus of about 100 acres in the heart of the city. It is one of the oldest colleges in the country, having been chartered in 1795. The Memorial Chapel on the campus was built in 1924, by public subscription, in honor of the soldiers who lost their

lives in World War I.

Airport. The Schenectady airport, located near the intersection of Maxon and Saratoga roads, about three miles from the city, is a well-equipped field with regular mail, passenger, and express service.

Transportation. Schenectady is located on the main line of the New York Central Railroad and on the Susquehanna Branch of the Delaware & Hudson Railroad. The Boston & Maine and the West Shore railroads maintain stations near the city. There is motorbus or trolley line service from Schenectady to all neighboring points. Excellent highways lead in every direction from the city.

Industries. The largest plant of the General Electric Company is located in Schenectady, with over 360 buildings and a ground area of 645 acres. Its broadcasting station, WGY, is known throughout the country. One of the largest locomotive works in the United States, that of the American Locomotive Company, occupies ninety acres on the banks of the Mohawk River and Barge Canal. Among other establishments are machine shops and manufactories of varnish, knit goods, baseballs, and porcelain and mica

Institutions. The Army Reserve Depot at South Schenectady covers 210 acres. Other institutions include the Historical Society, a Y. M. C. A., the Glenridge Sanitorium, the Ellis Hospital, Chamber of Commerce, and the club house of the American Legion.

History. Schenectady had its beginning in 1661, when Arendt van Curler and fourteen other Dutch pioneers applied to the Council of State for permission to purchase the site from the Indians, who demanded in return "whyte wampum, six koates, thirty barres of lead, and nine bagges of powder." The name Schenectady, which means End of Trail, was given by the Indians, as the place marked the junction of Indian trails from the north, south, and east. The settlement prospered, but in 1690 suffered a terrible French and Indian massacre. A second massacre occurred in 1748, but the place was rebuilt, and soon became an important trading post. Schenectady was chartered as a borough in 1765, and became a city in 1708.

SCHEVENINGEN, sKa' ven ing en, a seaside suburb of The Hague. See HAGUE, THE. SCHICK, Bela (1877-), Hungarian

bacteriologist, and discoverer of the Schick test

for diphtheria (which see).

SCHILLER, shil' ur, JOHANN CHRISTOPH FRIEDRICH VON (1759-1805), a German poet, born at Marbach, Württemberg. He was educated at the Karls-Schule at Stuttgart, where for a time he studied law, and later took up medicine. There, when only seventeen years old, he began to write his romance, The Robbers, a play published in 1780. At twentyone years of age, he had written a treatise On the Connection of the Animal and Intellectual Nature of Man, which was published in important Berlin journals and discussed by the leading European scientists of the day.

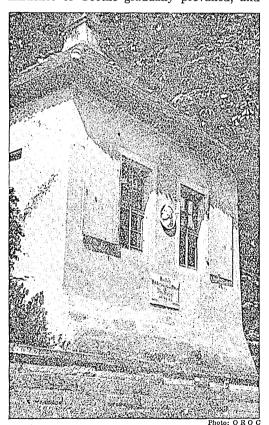
When, in 1782, The Robbers was performed at Mannheim, Germany, Schiller, then an army surgeon, secretly left his regiment to see it, and was arrested by the military authorities. He soon escaped from prison, and in a remote village wrote two other plays, The Conspiracy of Fiesco and Cabal and Love. Afterward, he ventured to return to Mannheim, where, unmolested, he became poet to the local theater, and composed some romantic verses that were widely copied. He then conceived the principal ideas for the plot of his famous drama Don Carlos, and went to Dresden to prepare himself for the task by close historical study of the United Netherlands. The play was presented at Leipzig in 1789, and gained him national

fame. This success won for him the friendship of some of the greatest writers of Europe, among them Goethé, who procured for him the professorship of philosophy at the University of Jena. He lectured more often, however, on history than on philosophy, and nearly all his writings during the next six years dealt with historical themes. It seemed for a time that the



SCHILLER

poet was lost in the scholar, but the literary influence of Goethe gradually prevailed, and



SCHILLER'S STUDY

At Dresden, Germany. The medallion was put in place after the poet's death.

after 1795 he produced some of the most spirited ballads and songs in any language.

In 1799 Schiller again wrote a masterpiece for the stage in his Wallenstein, and during the next two years, composed the famous tragedies, Maria Stuart, dealing with Mary, Queen of Scots, and The Maid of Orleans, telling the story of Joan of Arc. In 1804 he reached the climax of his power as a writer of dramas in his powerful William Tell, a piece of work that has seldom been surpassed in dramatic literature. His last days were spent at Weimar, Germany, where he died May 9, 1805. Schiller's only superior in German literature is Goethe, and it is doubtful whether even the latter surpassed him in vigor and ability to create stirring situations on the stage. His dramas are among the great classics.

SCHILLING, shil' ing, JOHANNES (1828-

SCHILLING, shil' ing, JOHANNES (1828-1910), a German sculptor whose greatest masterpiece is a colossal national monument commemorating the Franco-German War.

This work is on the Niederwald, a mountain opposite Bingen on the Rhine. Among Schilling's other important works are the Morning, Noon, Evening, and Night; at Dresden; a statue of Schiller, at Vienna; the War Memorial, a soldiers' monument, at Hamburg; and monuments to Emperor William I and to Bismarck, at Wiesbaden. Schilling was born at Mittweida. in Saxony, and re-



SCHILLING

ceived his art education in Berlin, Dresden, and Rome. The models of many of his figures are in the Schilling Museum at Dresden.

SCHIPA, ske' pah, Tito (1890), operatic tenor and recitalist, was born at Lecce, Italy, and educated in the seminary there. He sang almost from babyhood. In early youth he also displayed talent as a composer, and a mass from his pen was sung in the cathedral at Lecce by order of the bishop. He was destined for the Church, but the same bishop, hearing his tenor voice in the seminary, offered to pay all the cost of training, and for five years the youth studied under the maestro Alceste Gerunda.

After another year of preparation under Emilio Piccoli at Milan, Schipa made a triumphant début in *Traviata*. In 1913 he sang for the first time with Madame Galli-Curci in *La Sonnambula*, in Milan, and six years later, he made his début with the Chicago Opera Company and the same noted diva. From 1914 to 1918, he sang at the great Italian opera houses in Rome and Naples; in Spain, at Barcelona,

Seville, and the Royal Opera, Madrid; and in the foremost opera houses of South America.

He appeared in the United States in 1919, and performed with great success as premier

tenor with the Chicago Civic Opera Company, until it disbanded in 1932. In the concert field, his superb voice has been widely heard in America outside the operatic centers, and the popularity of the artist is enhanced by a most pleasing personality. In opera, he sings the principal tenor rôles in Barber of Seville, Lakmé, Lucia, and La Tosca, as well as those in Traviata and La Sonnambula, in which his earlier successes were

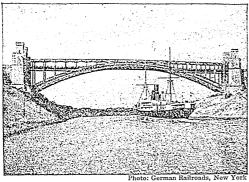


TITO SCHIPA

achieved. He makes his home in Rome. SCHISM, siz'm, OF THE WEST. See Pope. SCHIZOMYCETES, skiz o mi se' teez. See

BACTERIA AND BACTERIOLOGY.

SCHLESWIG-HOLSTEIN, shlayz' viK hohl' stine, before World War I, a province of the kingdom of Prussia, in the southern



KIEL CANAL IN SCHLESWIG-HOLSTEIN
High bridge over the Kiel Canal at Levensau. This
famous canal connects the North Sea and the Baltic,
and is one of the important waterways of the world.
Kiel is located at the east end of the canal.

portion of the peninsula which separates the Baltic and the North seas. It was divided into North Schleswig and South Schleswig, the former being largely Danish in population. Since 1920, a section in the north has belonged to Denmark. The German portion now forms the Prussian province of Schleswig-Holstein, which has a total area of 5,819 square miles and a population of about 1,520,000.

Originally, the province consisted of two Danish duchies, Schleswig in the north and Holstein in the south (separated by the River Eider), and the Danish language continued to predominate in the northern sections. At the close of the Seven Weeks' War, the two duchies became a part of Prussia (1866). The effort to Germanize the northern section only strengthened the Danish national consciousness; in 1920 an international commission took charge of a plebiscite (election), which restored to Denmark that part of Schleswig which lies north of Flensburg fiord and of a line drawn west from there. It has an area of 1,500 square miles. In 1930 it had a population of 177,696.

The country is for the most part a level plain, with great tracts of moorland in the interior. On the eastern coast there are several good harbors, for the shore line is indented by many narrow inlets or fiords. On the western coast, which is all lowland, dikes have been built to shut off the sea. Chief among the rivers is the Elbe, which bounds the province on the south.

The people are engaged chiefly in farming. Commercially, the province is one of the most important in Germany. It is crossed by the Kiel or Kaiser Wilhelm Canal, and the port of Kiel was the foremost naval station of the former empire.

For political map, see GERMANY (map).

Related Subjects. The reader is referred to:

Bismarck-Schönhausen, Kaiser Wilhelm Canal Prussia
Denmark (History) Seven Weeks' War Germany (History)

SCHLEY, sli, WINFIELD SCOTT (1839-1911), an American naval officer, commander of the

expedition which rescued the Arctic explorer Greely, and senior officer in command at the Battle of Santiago, was born in Frederick County, Md. He entered the Naval Academy in 1856, and was graduated four years later. During the years 1860-1861, he was on duty in China and Japan, and the next year, with the rank of lieutenant, took part in the Mississippi River campaign un-



WINFIELD SCOTT SCHLEY

Photo: Brown Bros.

der Farragut, his first service in the War of Secession. He was advanced to the rank of lieutenant commander in 1866, and then filled a position as instructor in the Naval Academy for three years. The rank of commander was given him in 1874.

When the third expedition for the rescue of the Arctic explorer Greely was sent out in 1884,



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Schley was given charge of it, and after cruising through 1,400 miles of ice, effected Greely's rescue; in recognition of this service, he received a gold medal. In 1886 he published a book entitled The Rescue of Greely, and two years later was advanced to the rank of captain. While in command of the Baltimore, at Valparaiso (1889-1892), several members of his crew were killed by natives. Schley negotiated the difficulty, obtaining an apology and an indemnity of \$75,000 from the Chilean government. Later, he was selected to convey the body of John Ericsson, inventor of the Monitor, to Sweden, and while there was presented with a gold medal by the king.

In 1898, Schley, then a commodore, was selected to take charge of the flying squadron in the Spanish-American War. During the temporary absence of Rear Admiral Sampson, Schley, on the *Brooklyn*, directed the Battle of Santiago, destroying the entire Spanish fleet, for which he was promoted to the rank of rear admiral. In the controversy which followed this engagement, he was declared by some to have been the real victor, but by others was charged with "irregularities," and at his request, a court of inquiry was appointed. The report, though not wholly favorable to him, recommended no action. See Sampson, WILLIAM T.; SPANISH-AMERICAN WAR.

Schley was one of the commissioners selected to direct the evacuation of Porto Rico; in 1800 the command of the South Atlantic squadron was given him; but in 1901, in his sixty-second year, he withdrew from active service.

SCHLEYER, sli' ur, Johann Martin. See Volapük.

SCHLIEMANN, shle' mahn, Heinrich (1822-1890), a German archaeologist who made valuable contributions to the world's knowledge of early Grecian civilization. When very

young, he shipped as a cabin boy on board a boat bound for Venezuela. The ship was wrecked, but Schliemann was rescued and taken to Amsterdam, where he busied himself in acquiring a knowledge of the principal European languages. He amassed a fortune in Russia, devoted several years to travel, and in 1868 he began to devote his entire time to archaeological investigations in the



SCHLIEMANN

East. In 1870 he began excavating ruins which he believed to be the site of ancient Troy, and he continued this work, with interruptions,

until the year of his death. He also started investigations in 1876 on the site of ancient Mvcenae, in Greece, and in 1877 unearthed the five tombs which, in the days of Pausanias, were believed to be those of Agamemnon and his companions.

Writings. His published volumes include Ithaca, the Peloponnesus, and Troy, concerning the site of Troy; Trojan Antiquities; and Mycenae.

SCHMALKALDIC, shmahl kal' dik, LEAGUE, a defensive alliance formed at Schmalkalden, Prussia, in 1531, for the support of religious and political freedom of Protestants, and in opposition to Emperor Charles V and the Roman Catholic states. The League, which was originally composed of nine Protestant princes and eleven imperial cities, was joined later by five other princes and ten imperial cities. The elector of Saxony and the landgrave of Hesse were elected chiefs of the alliance, and were commissioned to manage its affairs. In a war of 1546-1547, the Protestant army was forced to retreat, and the imperial army subdued the northern members of the League and advanced into Franconia. The combined armies of Saxony and Hesse were defeated at Mühlberg, on April 24, 1547. Maurice, then elector of Saxony, subsequently accomplished the object of the League. By brilliant diplomacy and generalship, he compelled the emperor to grant the Treaty of Passau in 1552, which secured the religious freedom of the Protestants. See REFORMA-TION, THE.

SCHNECKENBURGER, MAX. See WACHT AM RHEIN.

SCHNEEKOPPE, shna' kohp e. RIESENGEBIRGE.

SCHNITZER, ED-See Emin OUARD. Pasha.

SCHNORR VON CAROLSFELD, shnohr fohn kah' rohlsfelt, Julius (1794-1872), one of a group of German painters who, at the beginning of the nineteenth century, endeavored to revive the Christian spirit of early religious art. They, like the English Pre-



SCHNORR VON CAROLSFELD

Raphaelite school (see Pre-Raphaelites), turned to the early religious painters of Italy for inspiration and guidance. Schnorr was born at Leipzig. For a while he studied at Vienna, but later went to Rome, where the other German painters interested in this movement had gone previously. Here he distinguished himself by painting a series of frescoes on the walls of the Villa Massimi.

In 1827 he was commissioned by King Louis of Bavaria to paint for his new castle at Munich a series of frescoes illustrative of the *Nibelungenlied* and incidents in the lives of Charlemagne, Rudolph of Hapsburg, and Frederick Barbarossa. In 1846 he was appointed professor at the Fine Arts in Dresden, and director of the royal picture gallery. While here, he designed 180 pictures to illustrate the narratives of the Bible, which many consider his finest work. He also executed notable stainedglass windows for Saint Paul's Cathedral, London, and for Glasgow Cathedral. Among his associates were Cornelius, Veit, and Overbeck. See Cornelius, Peter von.

SCHOENBEIN, shön' bine, C. F. See Guncotton.

SCHÖFFER, shöf' ur, Peter. See Gutenberg, Johannes.

SCHOFIELD, sko' feeld, John McAllister (1831-1906), an American soldier in the Union army throughout the War of Secession. He

was born in Chautauqua County, N. Y., and was graduated at West Point in 1853. At the outbreak of the War of Secession, he became major of the First Missouri Volunteers, and commanded in turn the District of Saint Louis, the Army of the Frontier, and the Army of the Ohio. In 1862 he was promoted to the rank of major general of volunteers. During Sherman's Georgia



JOHN M. SCHOFIELD

campaign, and in the Battle of Franklin, he rendered distinguished service and was brevetted brigadier general in the regular army in recognition of his bravery. Subsequently, he was sent to North Carolina, where he captured Wilmington. He continued in the army after the war, and in 1868 was made Secretary of War, to succeed Edwin M. Stanton. In 1895 he retired with the rank of lieutenant general, after seven years as commanding general of the army.

SCHOLARSHIPS AND FELLOWSHIPS. Probably 50,000 students in the United States annually enjoy the benefits of scholarships in higher educational institutions. No one knows the exact number. This is merely an estimate based upon sources of information readily available. These sources include a number of published lists, of which the more important are Fellowships and Scholarships Open to

American Students for Study in Foreign Countries (Institute of International Education Bulletin No. 3, November, 1932); Fellowships and Scholarships for Advanced Work in Science and Technology (National Research Council Bulletin 94, 1934); College and University Scholarships (The New Era Teachers Service, 1935); and Scholarships and Fellowships Available at Institutions of Higher Education (United States Office of Education Bulletin No. 10, 1936). Also, many states provide by law for scholarships to local institutions.

Information concerning these 7,000 or more scholarships is a matter of public record. Further, universities and colleges grant many scholarships not included in the usual published lists. It is difficult to determine how many such scholarships are granted, but examination of the catalogs of several hundred institutions indicates that the number is very large. In some institutions, as many as one-fifth of the students are receiving scholarship aid. If half of this proportion were the average for all the higher institutions of the United States, the total number of scholarships would be nearer 100,000 than 50,000.

The value in dollars and cents to students who hold scholarships is even more difficult to The annual value of individual scholarships ranges from as low as \$25 up to as high as \$2,500 or more. The expense covered may include only a portion of tuition and fees, or it may be sufficient to provide generously for all living costs, as well as for all the educational charges imposed by the institution. Some indication of the extent of such aid is afforded by a few examples chosen from the organizations that grant scholarships and fellowships in considerable number. Various branches of the American Association of University Women provide scholarships. The American Scandinavian Foundation supplies about \$20,000 annually for fellowships, and the China Institute in America, from \$25,000 to \$90,000. The General Education Board contributes from \$25,000 to \$50,000, and New York state more than \$300,000. It is certain that the total amount distributed annually to aid students to secure or to complete their education is far greater than is ordinarily supposed. The amount of capital invested at a conservative rate of interest, necessary to produce the money value of scholarships and fellowships granted in the United States, would run into the tens of millions of dollars. The John Simon Guggenheim Memorial Foundation alone has an endowment fund of several million dollars for this purpose.

The establishment of scholarships and fellowships is inspired by a wide variety of motives. General belief in the advantages of higher education, and philanthropic desire to help poor but able students, are very common causes for gifts of this kind. States establish scholarships partly from these motives, but also as a means of selecting and training the most capable of its young people, in order that the community may prosper by reason of intelligent and productive leaders. That scholarships do provide a means of selecting the best students is evidenced by the fact that less than one per cent of those who have won New York state scholarships upon the basis of their highschool records have failed in their college work. It is interesting to note that sixty-six per cent of these New York scholarships were won by girls.

Quite frequently, scholarships are endowed to establish memorials for deceased friends or relatives, more useful as well as more lasting than granite monuments. The Guggenheim Memorial Fellowships, providing educational opportunities each year for seventy-five scholars, artists, and scientists, are of this kind. Of similar character are scholarships open only to persons who bear the name of the founder. Thus there are scholarships that can be granted only to persons named Smith, or Howard, or Curtis, and so on. Or the donor may wish to establish a fund that will serve as a perpetual aid to his community, and specifies, therefore, that the scholarship shall be granted only to boys or girls of his home town, county, or state.

But by far the greatest number of individual scholarships are established in order to promote study that will redound to the advantage of some special interest. The most common of these scholarships are those intended to promote the study of some particular subject in which the donor is interested. Because of this fact, aid to the student in almost any field is available. New York state has a special series of scholarships for teachers of trade and technical subjects. The American Scandinavian Foundation recently brought to America a large group of students to study the practical aspects of American business and industrial methods. The student of philology, forestry, geography, anthropology, home economics, engineering, astronomy, mathematics, or of almost any other subject, will, upon inquiry, find liberal provision for further study if he has special abilities and an outstanding record as a student.

In addition to encouragement of the study of specific subjects, a wide range of scholar-ships exists for the promotion of other interests. Thus we have scholarships designed to further the higher education of women, to preserve adherence to and to raise the scholarship of specific religious denominations, and to promote child and general health. Some institutions grant certain scholarships in order to control the character of their student bodies. Radcliffe College, for instance, which draws seventy-one per cent of its enrollment from

Massachusetts, believes that the life of the college would be enriched and the outlook of its students broadened by the attendance in larger numbers of students from other and more distant states. In order to bring this about, the United States has been divided into fifteen districts, and a scholarship is offered to a student from each of these regions. The fifteen students thus encouraged to come to the college will not, of course, by themselves change the character of the student body, but it is assumed that they will bring friends from their own neighborhoods, and in this way greatly multiply the effectiveness of the scholarships in accomplishing the purpose for which they were founded.

Because of the importance of international relations, and especially because of America's closer relations with other countries since the World War, there has been a remarkable development in the number of international scholarships and fellowships, for study both in other countries and in the United States. The best-known of the international scholarships are the Rhodes Scholarships (which see), which provide three years' work for students of the United States and of other countries, at the University of Oxford in England. But there have been scholarships also, such as those provided by the Henry P. Davidson Fund, used to bring students of the English universities of Oxford and Cambridge to the United States for advanced study.

Scholarships have been available not only for students from almost all the nations of the world, but also for American students in many foreign countries. The outbreak of World War II in 1939 temporarily stopped the exchange of most of the scholarships with Europe. The Department of State refused visas for American students to study there, but the exchange with Latin America continued.

The Institute of International Education was organized to care for the interests of foreign students in the United States, and of American students in foreign countries. It is probably the best-informed single agency interested in international scholarships.

Almost all of these scholarships depend for their value in promoting international understanding upon the power of the acquaintance and friendship developed between the future national leaders by residence and study in foreign countries. But some are intended also to promote better relations by encouragement of study of specific aspects of international intercourse. Thus the scholarships granted by the Penfield Foundation are intended to further advanced work in international law and The scholarships granted by diplomacy. Georgetown University Foreign Service School to Persian students, and to students of almost all of the Latin American countries, are for the purpose of providing trained workers in the field of international industrial and business relations, as well as in government foreign service.

Two special aspects of scholarship aid should be mentioned in connection with international scholarships. First, practically all of these scholarships and fellowships require that the student to whom they are awarded shall have considerable familiarity with the language of the country where he proposes to study. It thus becomes important for the student of the physical and social sciences, as well as for the language specialist who hopes to win one of these honors, to prepare himself thoroughly in at least one language, and preferably in two. Secondly, the systems of education in different countries vary so widely that it is extremely difficult to determine what credit will be given for foreign study by the institutions of the student's native country. Considerable assistance in this respect is afforded to the institutions of the United States by the Foreign Service Section of the United States Bureau of Education. A large part of the work of the Foreign Service Section consists of the evaluation of the work of foreign educational institutions in terms of our collegecredit system. The work of scores of foreign colleges and universities has been evaluated carefully, and information of this kind is thus available to the officers of the higher institutions of the United States.

In view of the various purposes for which scholarships are established, and because of the somewhat whimsical and arbitrary provisions frequently prescribed as conditions of award, only two rules can be stated in answer to the question of what must be done to win a scholarship or fellowship. First, high standing as a student in high school or college is almost invariably one of the most important conditions of award. Secondly, character, as evidenced by habits of industry, by honesty, and by ability to secure the respect of associates, is emphasized almost as frequently as success as a student. See EDUCATIONAL FOUNDATIONS.

SCHOLASTICA, sko las' tih kah, SAINT, sister of Saint Benedict. See Monasticism,

page 4580.

SCHOLASTICISM, sko las' tih sis'm, the philosophy of the schools of the Middle Ages. It represented an attempt to fuse the beliefs of the Church with the logic of Aristotle, just restored to Europe by the Saracens. The greatest teachers of the scholastic method were those of the thirteenth century, among them being Albertus Magnus, Roger Bacon, Duns Scotus, and Thomas Aquinas. The latter was known as the "Angel of the Doctors"; he outlined the whole scheme of Roman Catholic theology in his great work, Summa Theologia. Though the later scholastics busied themselves with many unprofitable speculations—such as "How many angels can be supported on the point of a needle?"-the whole movement was valuable in awakening the mental life of Europe from the lethargy of previous centuries, and in preparing the way for the revival of classical learning known as the Renaissance.

Related Subjects. The following articles in these volumes will make clear the references in the foregoing discussion of scholasticism:

Aquinas, Saint Thomas Aristotle Bacon, Roger Duns Scotus, Joannes Renaissance Saracens



CHOOL. The builders of the American republic very clearly foresaw the important part that education would have to play in making the new nation successful. Benjamin Franklin, throughout his life, was deeply interested in extending and improving education. He founded the great academy in Philadelphia that later became the University of Pennsylvania. In 1787 Thomas Jefferson said, "Above all things, I hope the education of the common people will be attended to." He himself drew

up the plans for the University of Virginia and exerted himself to the utmost, though unsuccessfully, to persuade the early Virginians to establish a state school system. George Washington, in his famous Farewell Address of 1796, said, "Promote then, as an object of primary importance, institutions for the general diffusion of knowledge." John Adams, James Madison, John Jay, De Witt Clinton, and many others of America's early great men stood emphatically for public education and

helped mightily to promote it. The Ordinance of 1787, which set forth plans for the opening up of the great Northwest Territory, contained this often quoted sentence:

Religion, morality, and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged.

Many of the thirteen colonies during the Revolutionary and early national period drew up new constitutions in which definite provision was made for the establishment of public schools.

The faith of the American people in education has produced some very remarkable results, in the century and a half since the end of the Revolutionary War. What those results have been may be indicated briefly, in the following series of statements. More detail will be offered in the articles succeeding.

r. The number of illiterates (those unable to read and write) has decreased from about eighty-five to six out of a hundred people over ten years of age.

2. Schools have almost all become public and secular, rather than private and church-managed.

3. Going to public schools is no longer socially disgraceful, as it was in the day when most of the

public schools outside New England were for orphans, paupers, and charity pupils.

4. School attendance has been made compulsory through the elementary grades, or until fourteen, sixteen, or even eighteen years of age, depending upon the state.

5. Girls are now given the same educational opportunities as boys.

6. The schools at different levels have become joined or articulated into a continuous system, instead of being independent of one another or overlapping one another.

7. Education above primary levels is now regarded as the right of the children of all the people, instead of those of the upper classes alone.

American boys and girls now find a straight educational pathway leading from the kindergarten to the state university, with tuition free all along the way. Any boy or girl, given good health and determination, without regard to wealth, may pass through these schools, step by step, quitting the highest institution at last with an endowment of knowledge beyond the wildest dreams of mankind a hundred years ago. And in these public schools there are now about 25,000,000 boys and girls, nearly a fourth of the whole population, receiving the education upon which the welfare and success of American democracy depend.

Public Schools

Public schools include all schools that are supported by public funds. In the United States they are classified as common, or elementary, schools, high schools, evening schools, vacation schools, etc. All public schools are conducted according to the law of the state in which they are located; they are therefore under state control.

Elementary Schools. Elementary schools are those which give instruction in the elementary, or common, branches; that is, the so-called three R's—reading, writing, and arithmetic—plus the fundamentals of geography, history, science, and practical and fine arts. The majority of these schools contain eight years, or grades, of work. Many, however, now contain only six grades. In six of the Southern states, a seven-year elementary school prevails, and, in some New England communities, there may be found nine-year schools.

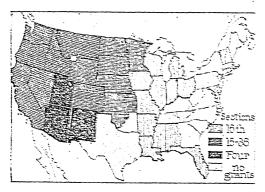
While early attempts to provide elementary education were made in Virginia, and by the Dutch in New Amsterdam (New York), it is to Massachusetts that we must look for the beginning of the American common school and the American system of public education. In 1635 the people of Boston, assembled in town meeting, requested Philemon Purmont to become schoolmaster, and voted him thirty acres of land in part pay for his services. The school begun by Purmont later became the

Boston Latin School, and has had continuous existence to the present time. Other settlements followed Boston's example, and within the next ten years, common schools were established in all the New England settlements. In 1647 the General Court of Massachusetts ordered every town having fifty families to appoint a teacher, whose wages were to be paid by the parents of the children he taught, or by the inhabitants in general. At the same time, townships having one hundred families were required to establish a grammar school to fit youth for college. The law establishing these two grades of schools laid the foundation of the public-school system in the United Three years later, a similar law was States. passed in Connecticut, but Rhode Island made no attempt to form a school system until 1790.

The Dutch established a system of public schools before New Netherland was taken by the English. After this event, but little attention was given to public education until after the Revolutionary War. Schools were founded by the Swedes in New Jersey and Delaware, and the charter granted William Penn provided for a system of education. This, however, was not carried out until long after Penn's death. The separation of people on the large plantations in the Southern colonies made the establishing of public schools impractical. Children of the planters were taught in their homes by tutors or governesses. Boys of wealthy

families were usually sent to England to complete their education. This system was perpetuated, and but few public schools were organized in the Southern states until after the War of Secession.

During the colonial period, private schools, taught by women as a means of support, were to be found in the New England and other colonies. To these the name of fame schools,



LAND GRANTS FOR COMMON SCHOOLS

How the states made provision for funds for their schools.

or kitchen schools, was often applied. No women were employed as teachers in the public schools. Occasionally, girls were admitted to the dame schools, but no provision for their education was made in the public schools.

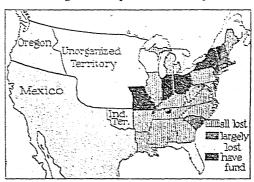
Support. Previous to the Revolutionary War, the support of the public schools was partly by taxation and partly by rates paid by the parents whose children received instruction, and this plan was continued for a long time after the war. In many colonies, the public schools were considered charity institutions, but in New England this view was not general. The plan of supporting schools from tuition fees, however, did increase class distinctions everywhere. Those unable to pay the rates felt badly misused, because their poverty thus became public knowledge. The wealthy, on the other hand, did not encourage free, or nontuitional, schools, partly because these meant increased taxes, and partly because such schools seemed to them socially degrading.

The resources of the country were so strained by the Revolutionary War that, for a time, taxation for the support of schools was light; but as the states regained their prosperity, public education began to receive better support. The first great impetus given to public education by the national government is found in the Ordinance of 1785 (which see). This consisted in setting aside the sixteenth section of land in every township (640 acres) for the support of public schools. By this provision, twenty-eight states were able to accumulate a school fund which, while lightening the burden

of taxation, enabled them to develop a highly efficient system of schools. In 1848, when the survey of the Oregon country was ordered, Congress ordered that the sixteenth and thirty-sixth sections in every township be reserved for the support of schools. All states admitted since 1850 have been granted two sections except West Virginia, which was formed from Virginia. Arizona, New Mexico, and Utah were granted four sections to the township.

The total area of the grants for common schools is about 132,000,000 acres. The value of this land at the government price of \$1.25 per acre would be about \$165,000,000. The actual value is, however, much greater, for in those states in which school lands are sold, prices ranging from \$5 to \$25 an acre are received. Unfortunately, many of these states sold their school lands at low prices, instead of holding them for increased valuation. In states where the lands are leased, the rental is based upon a higher valuation. To this fund, all states admitted to the Union since 1860 have added five per cent of the net receipts from the sale of all public lands within their respective borders.

The original states and Kentucky had no public lands, and these states petitioned Congress for grants from the national domain. The petitions were denied on the ground that such grants would be an obstacle to the settlement of the territory in which they were located. In lieu of grants of public land in Jackson's



USE OF SURPLUS REVENUE

What became of the \$25,000,000 surplus revenue which was distributed among the states for school purposes in 1836-1837.

administration, the surplus revenue in the United States Treasury, amounting to about \$28,000,000, was distributed among the states, each state receiving such a proportion of the entire amount as its population bore to the population of the United States. Some of these states reserved their portion for the support of common schools.

The funds provided must necessarily be increased by state and local taxation. The general school fund, that derived from sources

described above and from a state tax, is apportioned to the schools according to the laws of the respective states. In some states, the distribution is based upon school attendance; in some, upon the school population of the school unit, as a county, city, or school district; in others, more recently, upon a combination of factors and standards for the purpose of making educational opportunities more nearly equal in different communities.

Federal Aid. In 1917 the Sixty-fourth Congress passed the Smith-Hughes Act, making appropriations for paying the salaries of teachers of agricultural and industrial subjects, and for the training of these teachers. The act also created a Federal Board of Vocational Education. Its provisions are summarized below.

r. Appropriation for cooperating with states in paying the salaries of teachers, supervisors, and directors of agricultural subjects. These appropriations began with the sum of \$500,000 for the fiscal year 1918, and increased at the rate of \$250,000 each succeeding year until, in 1926, an annual appropriation of \$3,000,000 was reached. The sum allotted each state is based upon the ratio of its rural population to the rural population of the United States. There was added a provision that, prior to 1923, no state should receive less than \$5,000 annually, and no state less than \$10,000 after that date.

2. Appropriations for the purpose of coöperating with states in paying the salaries of teachers of trade, home-economics, and industrial subjects. These appropriations are for the same amounts as those for the teachers of agricultural subjects, but they are distributed on a different basis, the sum allotted each state being in the proportion that its urban population bears to the urban population of the United States, with the same provision for minimum allotment as in case of the appropriation for agricultural teaching.

3. Appropriations for coöperating with states in preparing teachers, supervisors, and directors of agricultural subjects, and of industrial and home-economics subjects. This appropriation began with \$500,000 for 1918, and increased \$200,000 each succeeding year until, in 1921, it reached \$1,000,000, the annual appropriation thereafter. It is divided among the states in proportion to their population.

The act created a Federal Board of Vocational Education, to consist of the Secretary of Agriculture, the Secretary of Commerce, the Secretary of Labor, the Commissioner of Education, and three citizens appointed by the President, one to represent manufacturing and commercial interests, one agricultural interests, and one labor interests.

Each state is required to create a state board of not less than three members, to coöperate with the Federal Board in the administration of the act, and to provide equipment and establish courses of study that meet the approval of the Federal Board, in order to receive the benefit of the act.

School Systems. The question "Has the United States a national school system?" is

often asked. There is no legally recognized national system of schools. The organization and management of the schools are left to each state, but these forty-eight independent organizations so closely resemble one another in their scope, courses of study, and plans of administration that it may be said that the United States exhibits a very considerable unity and similarity in courses of study and methods of administration. It is, therefore, not incorrect to speak of an American system of education. The chief agencies in securing this unity are the United States Office of Education and the National Education Associa-The United States Office of Education is organized under the Department of the Interior of the national government. At its head is the Commissioner of Education. The Reports and the many other printed documents of the Commissioner of Education have kept the leading school officials and educators informed upon the work done in all parts of the country.

The National Education Association is made up of thousands of school teachers, principals, superintendents, and other educationists. It holds annual conventions, at which are discussed methods of instruction and administration, courses of study, and every kind of educational problem. One of the departments of the N. E. A., that of Superintendence, made up of school administrators, has been especially influential in unifying courses of study and methods of administration.

Administration. We have seen that the first schools were established by communities, each community becoming responsible for the support of its own school. This plan was the beginning of the district system of management still found in many states. Settlers moved westward along parallels of latitude, and each state organized a school system similar to that of the state or states from which a majority of its inhabitants came. In this way, the New England method of administration was extended to all of the states north of the Ohio River. Later, in New England, the town replaced the district as the unit of administration. In all the states west of New England, the county is the unit for supervision and for certifying teachers, except in a few localities where the state issues the certificates. In the Southern states, the county is the unit of administration.

Each state maintains a department of public instruction, whose executive officer bears the title of superintendent of public instruction, as in Minnesota, or commissioner of education, as in Massachusetts. In case the department consists of a state board of education, the executive officer may be styled secretary. In some states, much of the work of the department of public instruction is largely advisory;

in others, it is of an executive nature. Incorporated cities are units of administration, and their schools are directed by a superintendent or a supervisory principal, who is responsible to the city board of education. The schools of rural districts are in charge of local boards who engage the teacher, provide the necessary school material, and have oversight of the school property. Their courses of study, how-



IN EARLY NEW ENGLAND

Monitor examining slates in a school in colonial days.

ever, are under the control of a county superintendent.

City schools are thoroughly graded, and every large city has its own course of study. In all states, uniform courses of study for the rural schools have been adopted, and manuals of directions for their use placed in the hands of the teachers. This procedure enables pupils in these schools to make systematic progress through the grades of elementary instruction.

Standardization. In all states in which high schools receive state aid, they are required to reach a standard fixed by the state university or the department of public instruction. This plan was so successful in bringing these schools to a higher standard that in several states a similar plan has been adopted for the one-room rural schools. The department of public instruction fixes requirements relating to the grounds, school building, furniture, library, course of study, qualifications, and salary of the teacher, and standards of teaching and maintaining discipline. One or more rural school visitors are appointed by the department, who visit those schools of each county which the county superintendent thinks may meet the requirements. In Illinois, if the school has reached the required standard, a plate marked Standard School, with the number of the district, is placed over the door of the schoolhouse. A still higher grade of school in this state is designated as a Superior School. In all states where the plan has been adopted, it has awakened new interest in education on the part of rural communities.

High Schools, or Secondary Schools. The first high school in the United States was the Boston English School (for boys), established in 1821. Previous to this, there had been two principal types of secondary schools, that is, schools next above the primary. The first of

these was the Latin Grammar School, imported from England with the early New England colonists. Laws in Massachusetts, as early as 1647, began to require the establishment of (Latin) grammar schools in towns of sufficient population. In this colony, and in others of New England, such schools were created in considerable number. They were supported partly by taxation and partly by tuition fees, and were devoted to the preparation of boys for college. Boys were admitted as soon as they could read and write fairly well, at any time from nine to eleven or twelve years of age, and were kept a varying number of years while trying to acquire a reading, writing, and speaking mastery of Latin, and some knowledge of Greek. These schools were small. rarely enrolling more than twenty or thirty boys, or having more than one teacher, invariably a man. They never served but a small fraction of the boys who might have profited from an education, and never admitted

By the end of the colonial period, these schools had come into competition with a new secondary school called the *academy*. Benjamin Franklin founded the first of these in Philadelphia, in 1750, copying its main features from recently developing English schools of the same name. The academies, which spread very rapidly over the country, particularly after the beginning of the nineteenth century, were usually privately established, endowed, and controlled. They charged tuition, which, however, was often very low. They offered many new subjects, and tried to prepare boys and girls not exclusively for college or the professions, but for ordinary business or home-making careers. They were very popular, and before many years, completely eclipsed the Latin grammar schools. In 1850, it is said, there were more than 5,000 academies operating, with over 12,000 teachers and 260,000 pupils. They admitted pupils who had finished the elementary schools, which by this time



A COLONIAL SCHOOL

were beginning to run through eight years, and offered courses of from one to four or more years.

The high school at the start did not differ much from the academy, except that it was under public control. Very soon, however, it began to drop tuition charges and become free, as was already the case with the public elementary schools. A good many years went by before people were all convinced of the wisdom of paying completely for secondary education out of public money, and many lawsuits arose out of opposition to the change. A famous decision was handed down by the Michigan Supreme Court in 1874, in what is known as the Kalamazoo Case, which upheld the right of a community to levy taxes for the support of public secondary education. This decision became the legal precedent which determined the decisions of similar cases in other states, thereafter.

For many years, there was keen rivalry between the private academies and the public high schools, the issue remaining in doubt, in some states, even up to the present century. Gradually, however, in the latter half of the nineteenth century, the free high schools, publicly controlled and supported, open to all without any discrimination—the people's colleges, as they were called-forged ahead. In 1890 the Commissioner of Education reported 2,526 free public high schools, with 9,100 teachers and 202,968 pupils. Of all the pupils ther in public or private secondary schools, sixty-eight per cent were in the public schools, and thirty-two per cent were in the private institutions. Since 1890, the high school has been far and away the fastest-growing educational institution in America. There are now more than 25,500 high schools, with over 251,527 teachers and in excess of 5,974,537 pupils. There are more than 3,327 private schools, with 18,500 teachers and 270,000 pupils. The gain in high-school enrollment since 1890 has been almost 3,000 per cent, as compared with a population gain of over 100 per cent. For every week since 1890, more than ten new high schools have been established in the United States. In 1890 one person out of every three hundred was enrolled in a public high school; now, one out of thirty is so enrolled. Reports now indicate that more than 1,000,000 pupils graduate annually from public high schools, as compared with 20,000 in 1890. Almost half of the schools are small, enrolling fewer than 100 pupils, but there are many very large institutions in the cities, some enrolling nearly 10,000 pupils. In fact, the upper ten per cent of these schools, ranked according to size, enroll over half the total pupils now reported.

Many changes are now taking place in the organization and general character of the high school. Though the four-year school of grades nine to twelve is still the typical school, there are many two-, three-, five-, and six-year in-

stitutions. There are, in particular, upward of a thousand junior high schools. Subjects are constantly being added to the curriculum. in order to give a broader and richer preparation for life. Getting pupils into college is only a part of a modern high school's work. It is seeking to be a comprehensive school, fitting pupils not only for higher education, but also for their duties as citizens, as home-makers, as breadwinners, and as socially well-disposed, physically sound, and morally well-behaving members of the community. According to the size of the school, a variety of courses is offered-classical, scientific, general, commercial, economic, technical, industrial, agricultural, and teacher-training Some of these schools offer several courses. hundred subjects.

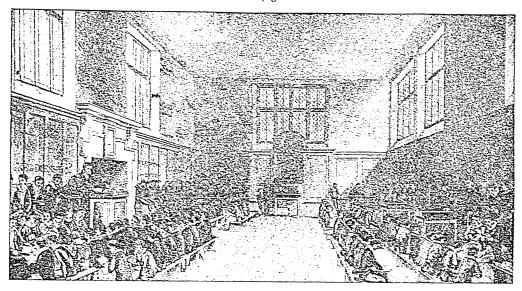
Besides the National Education Association, the colleges, and the reports of the Commissioner of Education, there are several strong regional associations of colleges and high schools that make for uniformity and standardization. The largest of these is the North Central Association of Colleges and Secondary Schools, which extends its accrediting over twenty states. Other associations of the sort are the New England Association of Colleges and Secondary Schools, the Association of Colleges and Preparatory Schools of the Middle States and Maryland, the Association of Colleges and Secondary Schools of the Southern States, and the Northwest Association of Secondary and Higher Schools.

In many states, the supervision of high schools is twofold. These institutions are under the direct supervision of the principal or city superintendent, as the case may be, and under the indirect supervision of the state university, which sends a high-school inspector to visit the schools and report their condition and progress. Graduates of schools which maintain the required standard are placed on the accredited list, and their graduates are admitted without examination to any college or university accepting this standard.

Reports of the Commissioner of Education show that about twenty-five pupils out of every hundred that enroll in the common schools enter high school, and that about forty out of every hundred who enter high school complete a four-year term. Of those who graduate from high school, about thirty-five out of every hundred go to college, and nearly fifty go either to college or other institutions. Of all the pupils enrolled in the public elementary and secondary schools, about one out of every thirty continues his education somewhat beyond high-school graduation.

Junior High Schools. See article Junior High-School Movement.

Junior Colleges. The traditional four-year high school has been showing a definite tend-



AN ENGLISH PUBLIC SCHOOL A CENTURY AGO
The illustration above is that of the famous Harrow School.

ency to expand upward as well as downward. As the expansion downward has resulted in the junior high school, so the expansion upward is resulting in the junior college. These institutions usually embrace two years' work, equivalent to the freshman and sophomore years of The first of them colleges and universities. was established as an addition to the township high school of Joliet, Ill., in 1902. Since then, over 500 have been formed, many as additions to the local high schools, particularly in California; others have originated as reduced liberal-arts colleges or transformed normal schools. They give an opportunity to many young people to receive two more years of education, before leaving home for the university or starting to earn a living. They are regarded generally as secondary in type and purpose, and the term higher education seems to be more and more applied to education beginning at the senior-college level; that is, with the junior year of colleges and universities.

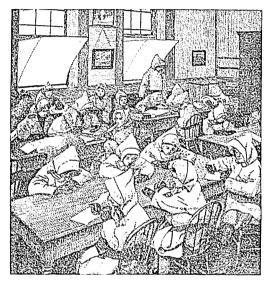
Evening Schools. Evening schools have formed a part of the educational system of the leading countries of Europe for more than a century, but the free public evening school in the United States has been developed since 1850, although several beginnings were made previous to that date. The purpose of these schools is to enable those who are employed during the day to extend their education. Evening schools now form a part of the publicschool system of every large city, and they are exerting a strong influence in favor of better education of the men and women who are wageearners. The pupils may be roughly divided into three classes—boys and girls who were compelled to leave school before they had completed the elementary course of study, men and women who wish to fit themselves for higher positions, and those who wish to complete some branch of higher education. In general, the pupils are older and more mature than those of the day school. They desire strong, practical work, and the methods employed must necessarily be different from those in the day school. One of the most important lines of work consists in teaching English to foreigners. Evening classes in the technical high schools pursue industrial or commercial subjects. The public evening schools in the United States employ about 20,000 teachers, and have an enrollment of about 1,000,000 pupils.

Besides the public schools, many private institutions maintain evening classes. Some of the most noted of these are the Cooper Union, New York; the Drexel Institute, Philadelphia; the Art Institute, Chicago; and the Young Men's Christian Association classes in all large cities

Consolidated Schools. The one-room rural school is at a great disadvantage when compared with the graded schools of cities or vil-This disadvantage is so apparent to many families in rural communities that not a few send their children to the nearest graded school. Moreover, one of the chief causes for the movement of the inhabitants of rural communities to the city is a desire to secure better educational advantages for their children. The consolidated school has been established to overcome these disadvantages, and to meet the demand of rural communities for better educational facilities. The first consolidated school was established in Concord, Mass., in 1869. At first it included the schools of only

two of the old districts, but within ten years, every district in the town had been abolished by vote, and the school represented the entire town. Since 1900, the movement for consolidation has grown rapidly, and the consolidated school is now found in nearly every state of the Union.

Consolidation is brought about when adjoining districts vote to unite into one district in accordance with the law providing for such union. The law providing for consolidation also provides for carrying pupils to and from school, and for paying for the transportation out of the school fund. In most states, the law is permissory, that is, it allows consolidation;



AN OPEN-AIR SCHOOL

The canvas screens at the windows protect the children from direct currents of cold air. (From photograph taken in a Chicago, Ill., school.)

in a few, it is in a measure compulsory, requiring the closing of all schools whose average attendance falls below a certain number.

Consolidated schools are now increasing at the rate of about 1,000 a year, and the number of one-teacher schools is gradually diminishing. In 1929 there were approximately 16,500 consolidated schools in the United States, with 160,000 teachers and 3,200,000 pupils.

The chief advantages of the consolidated school are: better teachers and more extended courses of study; better school equipment; opportunity for grading the pupils; larger classes; the enthusiasm that comes from numbers; better supervision; more regular attendance; opportunity to teach effectively such subjects as agriculture, domestic science, and manual training, and so interesting the pupils that they will remain in school a longer time; and in some instances, an equalization of taxes for school purposes.

Vacation Schools. Vacation schools have been opened in many cities for the purpose of preventing the undesirable effects of the long summer vacation, especially in congested quarters where children have no playgrounds. Some of these schools aim to keep the children off the street, and to give them some pleasant and profitable occupation during a part of the day. The girls may be taught sewing or cooking, and the boys woodwork or some other occupation. Studies in English may occupy a part of the time. In these schools, the playground is an important factor. Another type of schools offers regular school work for pupils who have failed of promotion. Both lines of work may be undertaken in the same school. In localities where most of the pupils come from homes of foreigners, much attention is given to teaching the children to speak and write English. The length of the term of the vacation school varies from four to eight weeks. One great advantage of these schools lies in the flexibility of the course of study, which enables each school to carry on those lines of work best suited to the community that it serves.

All-Year Schools. See article under that title in these volumes.

Continuation, or Part-Time, Schools. See that title, in these volumes.

Vocational Schools. See Education (Modern Tendencies: Vocational and Continuation Education); Vocational Education; Vocational Guidance.

Kindergarten. See that title, in these volumes.

Nursery Schools. See that title, in these volumes.

Special-Type Schools and Classes. A particularly fine development in public education to-day is the provision made by states and cities for the physically or mentally handicapped, and for those who in other respects may differ markedly from average, or normal, children. The states have established many schools for the blind, the deaf, and the feebleminded; the cities have recognized a number of other groups as well. Open-air schools for the undernourished, the physically run-down, and the tubercular are perhaps the most common of the special-type schools in cities. The first open-air schools were set up in New York City and Providence, R. I., in 1904. They are now found in practically all large cities, and in many smaller ones. Some are conducted as out-of-doors schools, on the roofs of buildings or under tent or other roofings. Some are conducted in open-window rooms. Special clothing, special kinds of work, special programs generally, supplemented by nourishing food, are some of the important features of such schools.

The reports of the Commissioner of Education indicate that there are now nearly 2,000

special-type schools in connection with city school systems in the United States. There are schools for anaemic children, for the blind, the deaf, the crippled, the tubercular, for cardiacs, for those with speech defects, for the mentally slow, for incorrigibles, and for the unusually gifted. The provision for these types of children is woefully inadequate as yet, but a substantial start has been made, in some communities at least.

Medical Inspection in Schools. Physical examination of 300,000 school children in New York City public schools showed that seventy per cent of them were defective. Thirty-five per cent of those examined had defective teeth; over ten per cent had defective vision; fourteen per cent, defective nasal breathing; and nearly fifteen per cent, enlarged tonsils. No child, among those examined, was able to do his best in school, because of his physical condition. It would seem that no further argument should be necessary to convince any community or board of education of the necessity for medical inspection of school children.

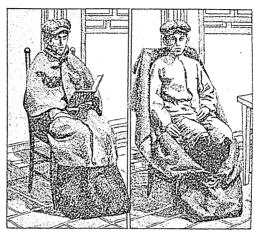
In the United States, medical inspection of school children was begun in Boston, in 1894, because of epidemics among the pupils in its public schools. In 1895 Chicago adopted a similar system, and New York and Philadelphia followed in 1897 and in 1898. Outside of these cities, the plan received little attention previous to 1907. Since that date, medical inspection has been introduced into practically all large cities and many small ones, in the United States and Canada. Over half of the states now require school or other authorities to provide for the medical inspection of pupils.

The chief purpose at first was the prevention of the spread of contagious diseases. Although that still is the main object in many communities, the more marked tendency to-day is to make it serve in the improvement of general health. Children are being examined more carefully and more frequently each year, better and fuller records are being kept, and increasing attention is being given to the treatment and correction of defects of all kinds. Good records now note the presence in children of defects of the senses, such as hearing and vision; of bodily parts, as nose, throat, teeth, glands, spine, feet, lungs; and of such life processes as blood circulation, digestion, metabolism, respiration, and nervous functioning.

Medical inspection has made the school nurse a necessity, and in large cities, nurses are employed. Their chief duties consist in following up the doctor's recommendations, treating children suffering from colds and other minor troubles, so that they may remain in school; watching for children who may need the doctor's attention; and visiting the homes

of pupils who are absent because of illness. This last duty often makes the nurse the connecting link between the home and the school.

The support of medical inspection in the United States is inadequate, and the best re-

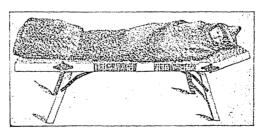


THE SITTING-OUT BAG

Shown closed and open. It provides protection to the feet and lower limbs.

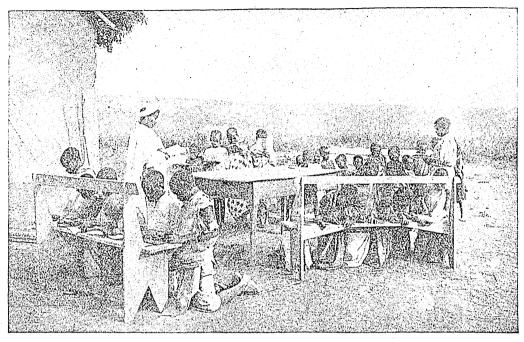
sults have not as yet been secured. In some cities, the work is in charge of the board of health, and the inspection is by physicians connected with this board. In many of the smaller cities, physicians donated their services when the work was introduced, and in nearly all cities, the remuneration is so small that experienced physicians cannot be secured.

School Credits for Home Work. Many cities are unable to maintain classes in manual



SLEEPING BAG AND COT A style used in many open-air schools.

training, home economics, or other lines of vocational training, and industrial conditions are such that the pupils receive little or no practical training in the affairs of life. To overcome this difficulty, educators have, in some cities and counties, arranged a system of credits for work done at home, or in other places besides the school. Boys may work in shops, stores, or business offices. Pupils may take music lessons, instrumental or vocal, and some schools allow credits for work done in literary societies meeting outside of the school-



IN THE HEART OF AFRICA
A native school in Angola, where the black boys and girls learn to speak the English language.

houses. In some rural communities, boys are given credit for various lines of farm work, and girls for canning, cooking, sewing, and housekeeping, though both may receive credits for work in which boys and girls can engage, such as gardening and raising poultry. In cities, credits are usually given to high-school pupils only. In case a pupil desires credit for work in music, the lessons must be given by a teacher approved by the superintendent or the principal of the high school, and a stated amount of time must be given to practice daily. In some instances, home work is super-

vised by the teachers; in others, the parents certify to it. In all cases, a stated amount of work is required. The credits vary under different systems, but they seldom exceed one credit for work done at home to fifteen for school work.

Wherever the plan has been tried, it has met with favor, since it enables pupils to acquire practical experience or to take studies not provided in the regular courses, without overworking or extending their time in school, and it increases the interest of the home in the work of the school.

Special Schools

Schools for Teachers. Every state system of education, and a number of county and city systems, include schools for training teachers. These schools are known as state normal schools, county or city training schools, and schools of education, or teachers' colleges. Many rural-school teachers and some elementary teachers receive their training in special courses for the purpose in high schools.

Normal Schools. The first public normal school in America was opened at Lexington, Mass., in 1839, and another was opened at Barre, Mass., the same year. From this beginning, the normal-school idea spread from state to state, until now every state maintains one or more of these schools, and one is maintained by the Federal government in the Philippine Islands. State normal schools are supported

by appropriations made by the state legislature. Most of them offer courses of study requiring four years for those students to complete who have not been graduated from a high school, and requiring two years for high-school graduates. In the elementary courses, the common branches are reviewed from the viewpoint of the teacher. The physical sciences with special reference to nature study, history, civil government, geography, and literature are required, and the elements of psychology and pedagogy are taught.

Every thoroughly equipped normal school has a training school including all the grades found in the public schools. Practice teaching in this school is an important part of the course, and the student must show herself to be a successful teacher before she can receive the di-

ploma of the school. Some normal schools make arrangements whereby the practice work is done in the city schools and in near-by rural schools. This is the better plan, since it brings the practice teacher in contact with the actual conditions which she must meet after graduation. All practice teaching is done under the supervision of the normal school. In advanced courses, more professional work is done, including more advanced work in psychology and pedagogy, child study, and the history of education. Courses vary in different states and in different schools in the same state, since each school must adapt its work to the needs of the locality to which it ministers. The chief work of normal schools consists in training teachers for graded and rural schools.

City Training Schools. City training schools are maintained in some large cities for the purpose of training teachers for the schools of the city. They are supported from the city educational fund, and are usually under the same management as the public schools. City training schools differ from state normal schools chiefly in adapting their work to the city course of study. Graduates of the city high schools are usually admitted to the city training school without examination, and a diploma of the training school is equivalent to a certificate of the city superintendent.

Teachers' Colleges, or Schools of Education. Since 1920, a great many of the normal schools just described have changed to teachers' colleges by extending their courses to four years beyond high school, and offering bachelor's degrees. Out of more than 400 teacher-training institutions in 1926, 109 were classifiable as teachers' colleges, as compared with only forty-six, six years before. This expansion of normal schools into teachers' colleges has enabled them not only to offer a broader and better training for elementary teachers, but also to undertake the training of high-school teachers, a task previously left almost entirely to liberal-arts colleges and universities.

To be distinguished from these teachers' colleges of recent normal-school origin are certain older institutions and the educational departments of large universities. Some of these are called teachers' colleges, but more often they are known as colleges, or schools, of education. These institutions offer courses for college graduates leading to master's or doctor's degrees. They engage in research work in education, and their courses of study are designed to prepare students to teach in normal schools, to become superintendents of schools, or to take professional positions in other schools of education. Most of the state universities maintain schools of education. Harvard University and the University of Chicago have excellent schools of this kind, and Teachers' College affiliated with Columbia

University has become widely known as the largest educational training school of advanced grade in the United States. Practically all universities maintaining schools of education hold summer terms for the benefit of teachers of elementary and high schools. The work done during these sessions is similar to that of the state normal schools, but those attending have at their disposal all the advantages in the way of equipment and library facilities which a great university can offer.

Government Schools. The public schools of Alaska, the Canal Zone, Guam, Hawaii, the Philippine Islands, and Porto Rico are under the administration of the Federal government, being in charge of the Office of Education. The chief educational officer, usually styled director, or superintendent, of education, is appointed by the President and confirmed by the Senate, but the direction of the educational work is left to the Office of Education. From the academic viewpoint, the chief work of these schools is to teach the natives to speak and write the English language. In addition, the same branches are taught that are found in the elementary schools in the United States, but a larger proportion of the time is allotted to industrial work. However, the work of the teachers and supervisors does not stop here. They are expected to do whatever they can to elevate the standard of living, secure the introduction of sanitary measures, and to protect the natives from unscrupulous traders who try to purchase whatever they have to sell, much below the market price.

A good illustration is seen in the work of the Office of Education in Alaska. Every teacher is a social worker, and, in addition to performing the routine work of the school, strives in every way possible to promote the physical, moral, and industrial welfare of the natives, adults as well as children. Under direction of the teachers and nurses, the natives are encouraged to build sanitary homes. In some places, they are taught to raise vegetables. A number of coöperative stores have been established through the encouragement of the Office of Education, and these are under the supervision of teachers. The reindeer service, introduced into the territory by the Office in 1892, is still under its supervision, and is proving to be one of the most beneficial measures thus far undertaken for the benefit of the Eskimos. All medical work, including the furnishing of supplies, is

also in charge of the Office.

In all outlying possessions, the government schools have exerted a strong influence over the native people in elevating their standard of living, strengthening their moral character, and preparing them for citizenship.

Government schools for Indians are in charge of the Commissioner of Indian Affairs [see In-DIANS, AMERICAN (Education)]. The schools



of Washington, D. C., are controlled by a local board of education. One-half the expense of their maintenance is appropriated by Congress, and one-half is provided by the city.

Moonlight Schools. See article under that

title in these volumes.

Parochial Schools. Parochial schools are established and maintained by religious denominations. Broadly, the term would include Church educational institutions of all grades, but as it is ordinarily used, it applies to elementary schools only. Nearly all denominations maintain parochial schools for one cause or another. In all, the doctrines of the Church by which the school is maintained are taught. The course of study and methods of instruction conform to those of the public schools of the city or state in which the school is located. In some of these schools, girls are taught sewing and cooking, and boys are given work in manual The Roman Catholic, Episcopal, and Lutheran churches maintain high schools in some localities, and practically all denominations have mission schools for the education of Indian and negro youth. Parochial schools are supported by their respective churches or so-cieties, and by the income from endowment funds and tuition.

Technical Schools. Technical schools were originally schools of engineering. The first school of this sort in America was the Rensselaer Polytechnic Institute at Troy, N. Y., founded in 1824. About twenty years later, the universities began to give attention to technical education, and the Sheffield Scientific School at Yale and the Lawrence Scientific School at Harvard were founded in 1847. The latter extended its scope to include courses in engineering, mining, architecture, chemistry, biology, geology, and other sciences. In 1862 Congress passed the Morrill Act, which made large grants of public land to the states for establishing agricultural experiment stations. This act gave a great impetus to technical education, and now every state has its agricultural experiment station (see AGRICULTURAL EDUCATION). All technical schools fit men for professions.

There are other technical schools of high order not connected with universities, but doing a work of equal grade. Among these are the Rose Polytechnic Institute, Terre Haute, Ind.; the Pratt Institute, Brooklyn, N. Y.; the Case School of Applied Science, Cleveland, O.; and the Illinois Institute of Technology (formerly Lewis and Armour Institutes), Chicago. The Massachusetts Institute of Technology, a technical school of the highest grade, has become

affiliated with Harvard University.

Technical high schools fit students for trades. There are also trade schools of a technical character, such as the textile schools in Lowell, Lawrence, and Fall River, Mass.

Trade Schools. Trade schools are engaged in preparing their pupils for some trade, such as carpentry, bricklaying, printing, etc. They were established to take the place of the apprentice shop system, which the introduction of modern machines has made impracticable. Most of these schools require applicants for admission to be at least sixteen years of age, and to have a common-school education; consequently, they can do more advanced work than the elementary vocational schools.

The length of the courses varies from five or six months to four years. In the short courses, most of the time is devoted to practical work. In the longer courses, industrial drawing, mathematics, the physical sciences, and other related supplementary subjects, together with English, American history, and civil government, are required. There is a close resemblance between the trade schools with long courses and the technical high schools. M.H.W.

Related Subjects. Supplementary information in connection with this article will be found in the articles listed below. See, also, EDUCATION, and topics indexed therewith

Plan
Parent-Teacher
Associations

Project Method in Teaching Technical and Industrial Education

SCHOOL GARDEN. In the great movement which has as its slogan "Back to the farm," the school garden is having no slight influence. In Europe there are over 100,000 gardens cultivated by pupils, and the School Garden Association of America has members in every state in the Union and in most of the Canadian provinces, as well as in the dependencies of the United States. A garden is a practical laboratory in which the pupils gain first-hand knowledge of some of the principles of nature study, agriculture, and botany; and gardening is easily correlated with arithmetic, geography, drawing, composition, bookkeeping, and other school subjects. Furthermore, the cultivation of the soil is of fundamental importance in helping to solve the problem of keeping the world's population fed. School gardens are, therefore, an advantage from many points of view.

Best results are achieved in those communities where the school garden is conducted as a part of the regular curriculum, and the board of education provides a specially trained instructor to direct the regular teachers and to supervise the work. At the same time, much has been accomplished by schools not so fortunately provided for. In some communities, the gardening has to be done outside of regular school hours, but even so, the results have been such as to benefit the community.

The question of space is also a problem that must be dealt with differently in various localities. If possible, the school-garden plots should be in or adjacent to the school yard.

If it is impracticable to give each pupil a separate plot to take care of, the garden may be divided into rows. Every pupil should have definite work to do, and be required to put on record the results of his work. Where the space is very limited, the teacher should encourage the planting of window-box gardens. Even the borders along the edges of yards can be utilized.

In addition to the advantages already mentioned, a school garden is an economic gain of no mean importance. The money value of what such a garden can produce is often surprising; the lessons the pupils learn from turning labor into cash or its equivalent is in the highest degree educational. Here many boys and girls discover for the first time that wealth is inherent in the soil. M.V.O'S.

Related Subjects. In the articles Boys' and Girls' #H CLUBS and GARDENING will be found the practical details one needs to know in carrying on gardening work of this nature. Information about gardening can be secured by writing to the United States Department of Agriculture. See, also, lists of Related Subjects, in the Article GARDEN-

SCHOOLS, MILITARY. See MILITARY Schools.

SCHOOL SAVINGS BANKS. See Banks AND BANKING, subhead.

SCHOONER, skoon' ur. See YACHT AND YACHTING (Types of Rigs).

SCHOPENHAUER, sho' pen hou ur, ARTHUR (1788-1860), a German scholar who formulated a system of pessimistic philosophy. He was born in Danzig. In 1800 he began the study of medicine at Göttingen University, but abandoned it for the study of philosophy; in

1813 he was graduated from the University of Jena. Between 1814 and 1818, he made Dresden his home, writing at this time his greatest work, The World as Will and Idea. Later, he endeavored to lecture in Berlin in opposition to Hegel, the apostle of idealism, but was unsuccessful (see HEGEL, GEORG WILHELM). Disappointed and embittered, Schopenhauer removed to



SCHOPENHAUER

Frankfort-on-the-Main, where he spent several vears in seclusion. Late in his life, and after his death, the fame he had longed for attached itself to his name.

Though he overemphasized the tragic aspect of life, he performed a worthy service in the field of speculation. To him, the world was merely an idea of the mind, therefore nothing

in itself; art he believed to be the only knowledge not subject to the will and the practical needs of life. Otherwise, he believed that the only "necessary reality in the universe is will"; by will, he meant blind force, capricious and contrary as often as it was rational. From these premises, he derived the conclusion that there is no reason to believe that things will ever be better. To secure happiness, one must restrain all desires and aspire to a condition of negation similar to the Nirvana of Buddhism (which see). Schopenhauer believed himself to be the logical successor of Socrates. See Philosophy.

SCHOTTISCHE, shot' ish. See Dancing

(Modern Dances).

SCHUBERT, shoo' bert, Franz Peter (1797-1828), a German musician to whom the nations owe a debt of gratitude, for he com-

posed some of the world's greatest songs. His Erlking, Hark, Hark, the Lark, Wanderer, Serenade, and many others are unsurpassed in melody and charm, and are known to countless lovers of music the world over. Liszt characterized Schubert as the "most poetic musician that ever lived."

He was born at Vienna of a musical family, and at home learned the fundamentals of piano and



SCHUBERT

violin playing. His subsequent mastery of instrumental playing and of composition, however, came about largely through independent study and association with the best musicians of his time. He began to compose before he was fourteen, and his famous Erlking and Wanderer were created when he was only nineteen. Schubert was long hampered by poverty and lack of public recognition of his genius. He had to devote much precious time to the drudgery of teaching, and none of his compositions was published until 1821. His premature death, when he was but thirty-one, was the result of overwork and a bitter struggle with poverty and disappointment.

It is a remarkable tribute to the creative genius of the young composer that, in spite of these handicaps, he left to posterity over 600 songs, nine symphonies, two of which—the Unfinished Symphony in B Minor and Symphony in C Major-are famous; instrumental pieces for piano and violin, masses, choruses, operas, and an oratorio. His songs alone would place him among the immortal masters, but some of his instrumental compositions are of "Compared with Schuimperishable fame. bert's pen," someone has said, "Aladdin's lamp

seems a poor affair."

The story of Schubert's life forms the basis of the operetta Blossom Time, the score of which consists of his choicest melodies, and the theme song of which is a variation of his Unfinished Symphony.

SCHUMANN, shoo' mahn, Robert (1810-1856), a German musician who ranks with Schubert as a composer of songs, and with Chopin and Liszt as a master of piano technique. He was born at Zwickau, Saxony. Schumann's mother wished him to become a

lawyer, and the boy registered as a law student at the University of Leipzig when he was eighteen. His musical preferences, however, were too strong to admit of his adopting the legal profession. At the age of eleven, he had set the 150th Psalm to music, but he seems to have had no systematic instruction in music until he settled in There he Leipzig. became the pupil of



SCHUMANN

Friedrich Wieck, whose daughter Clara, herself a skilful pianist, became his wife in 1840. Under Wieck's instruction, Schumann made rapid progress, but his career as a pianist was cut short by a permanent injury to one of his fingers, the result of overzealous practice. He had determined, however, to abandon the profession of law, and at the age of twenty-one, took up definitely his work as composer and musical critic.

In 1834 he joined with several other young enthusiasts in founding a journal (Neue Zeitschrift für Musik) for the encouragement of high ideals in music. Through this periodical, Schumann called the attention of the public to the genius of Chopin, and gave loyal support to such rising musicians as Mendelssohn and Berlioz (which see). The period between 1834 and his marriage to Clara Wieck was rich in the products of his own genius, for it gave to the world his first symphony and some of his finest songs. Between 1840 and 1844, when he removed to Dresden, he composed the beautiful cantata Paradise and the Peri, and a famous quintet for the piano, and in the latter year, he began his composition of the music for Goethe's Faust. In 1850 the Schumanns removed to Düsseldorf. During their sojourn here, the composer's mind and health broke

down, and he died in 1856 in a private asylum for the insane, near Bonn.

As a song writer, Schumann is regarded as a disciple of Schubert, but he surpassed the latter in ability to make the music express the varying shades of feeling represented by the words. His songs were written to poems of Goethe, Heine, Byron, Burns, Moore, and other lyrists. Schumann's wife edited his complete works, which fill thirty-four vol-

SCHUMANN-HEINK, shoo' man hyngk', ERNESTINE, née ROSSLER (1861-1936), one of the greatest contraltos of her age, a marked favorite as a grand-opera star, as a concert singer, and as a radio artist. She was born at Lieben, in Bohemia. At the age of seventeen, she made her operatic debut as Azucena in IlTrovatore, at Dresden, singing thereafter in many parts of Germany and in London. From 1896 to 1906 she frequently appeared at Bayreuth.

Madame Schumann-Heink gave her first American performance at the Auditorium in Chicago, November 7, 1898. She made her initial appearance at the Metropolitan the following January.

Pre-eminently successful in the majestic contralto roles of Wagner's operas, her deep, rich voice was equally enjoyable in simple folk songs. Her singing and welfare work



SCHUMANN-HEINK

during World War I endeared her to thousands of soldiers. She was married three times and reared a family of eight children.

Gift to Soldiers. Grossmont, the estate of Madame Schumann-Heink, near San Diego, Calif., was given by the singer in 1928 as a refuge for sick and disabled veterans of World War I, and their families. Her words to the soldiers were:

"You have honored me by calling me 'Mother.' You honored me by honoring my boy, who died on a submarine. He may have killed some American boys with his submarine, but he could not help that. It was war, you know. But you honored him. is why I give you Grossmont. I love you; that is why I do this. I will love you until the Great Commander calls me."

SCHURMAN, shoor' mahn, JACOB GOULD), an American university president (1854and diplomat, born at Freetown, Prince Edward Island. He received his early education in Canada, later studied at Edinburgh University, and then spent two years at Heidelberg and Berlin. He was appointed professor of philosophy at Acadia College in 1880, and two years later accepted a similar position at Dalhousie College. În 1886 he left Canada to become professor of philosophy at Cornell University,

in 1891 was made dean of the Sage School of Philosophy, and from 1892 until 1920 was president of the University. He was chairman of the first United States Philippine Commission, in 1899.

Schurman was minister to Greece and Montenegro during 1912 and 1913. In 1921 he was appointed ambassador to China, and in 1925 was transferred to Germany, serving in a



JACOB G. SCHURMAN

like capacity for the succeeding five years. His works include several volumes on different phases of evolution; various reports, among them Philippine Affairs-A Retrospect and Outlook; The Balkan Wars; and Why America Is in the War.

SCHURZ, shoorts, CARL (1829-1906). In the words of former President Eliot of Harvard, Carl Schurz was "the greatest American citizen

of German birth." This soldier, statesman, and editor was a champion of freedom in two countries. He was born at Liblar, Prussia, and was educated at the University of Bonn, where he aided in the publication of a newspaper of liberal tendencies. He escaped arrest during the revolutionary period in 1848 by hurrying to Switzerland. In 1852 he emigrated to the United States, hoping there to carry out



CARL SCHURZ

his theories of universal liberty, and became a citizen of Wisconsin. Schurz was a delegate to the Republican national convention which nominated Lincoln, and was rewarded for his campaign services by appointment as minister to Spain. This position he resigned on the outbreak of the War of Secession. Schurz was commissioned brigadier general in 1862, and the following year was promoted to the rank of major general.

After the war, capitalists assisted him in establishing a German paper in Saint Louis (the Westliche Post), which became a power in the West. In 1869 he was chosen United States Senator from Missouri. When Hayes became President, Schurz was appointed Secretary of the Interior (1877-1881). At the end of his term, he became editor-in-chief of the New York Evening Post, formerly edited by William Cullen Bryant. In 1892 he was elected president of the National League for Civil Service Reform, and after six years, resigned on account of his declining strength. SCHUYLER, ski' lur, Philip John (1733-

1804), an American patriot, statesman, and

Revolutionary general, distinguished for the part he bore in the campaign which ended in the surrender of Burgoyne (see REVOLUTIONARY War in America). He was born in Albany, N. Y., of a family descended from Dutch emigrants. Schuyler showed unusual military skill as leader of a company which he recruited to fight against the French and Indians, in 1755.



PHILIP SCHUYLER

Between the French and Indian War and the

Revolution, he engaged in business. Schuyler was a delegate to the Continental Congress in 1775, and after the Battle of Bunker Hill, was appointed major general in the Continental army, being placed in command of the Northern New York division. His command of the colonial forces, however, did not long continue, as Gates managed to have himself unfairly appointed by Congress in his place; but Schuyler remained with the army, and to him is due the credit of Burgoyne's surrender at Saratoga. For alleged neglect of duty at Ticonderoga, he was tried by court-martial, but was acquitted with honor. Schuyler secured the neutrality of the Six Nations, and was later elected to numerous state offices and to the United States Senate. His grave in Albany is marked with a handsome monument. His daughter Elizabeth was the wife of Alexander Hamilton.

SCHUYLKILL, skool' kil, RIVER, in Pennsylvania, a stream which rises in a county of the same name, and flows southeastward for about 100 miles, entering the Delaware River at Philadelphia (which see). It furnishes water power for manufacturing. Part of the water supply of the city of Philadelphia comes from the Schuylkill. In 1908 the government in-

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stalled a filtration plant, and in 1914 funds were provided to widen the Schuylkill channel, the work being completed in 1925. Coal barges follow the river by dams and locks.

SCHWAB, shwahb, Charles M. (1862-1939), an American capitalist who amassed a great fortune in the steel industry. He was born at Williamsburg, Pa., but spent his childhood in Loretto, in the same state. While still a youth, he drove a stage from Loretto to Cresson, a dis-

tance of five miles. Schwab's connection with the steel industry began with his employment by the Carnegie Company as a stake driver in the engineering corps of the Edgar Thompson Steel Works. He rose steadily to the position of general superintendent of the Homestead Steel Works, serving in this capacity from 1892 to 1897. Later, he devoted his energies to putting the steel industry on a "trust"



CHARLES M. SCHWAB

basis, and in 1901 became president of the vast United States Steel Corporation. Two years afterward, Schwab was made president of the Bethlehem Steel Corporation, and during World War I, he managed the government shipbuilding enterprise.

Besides acting as chairman of the board of trustees of the Bethlehem Steel Corporation, Schwab held directorships in numerous other companies. In 1932, he was awarded the Melchett (British) medal "for distinguished service in industry." He was a generous con-

tributor to charitable institutions.

SCHWARTZ, *shvahrts*, Berthold. See Gunpowder.

SCHWATKA, shwot' kah, Frederick (1849-1892), an American Arctic explorer, born at Galena, Ill. After his graduation from West Point, in 1871, he became second lieutenant in the United States army. Becoming interested in Arctic exploration, he obtained leave of absence in 1878, and undertook an expedition in search of records and remains of Sir John Franklin (which see) and his party. He traveled by sledge a distance of almost 3,000 miles, exploring carefully the northern coast of America in the region where Franklin had been, and a part of King William Land. His search was rewarded by the discovery of graves and skeletons, but he found no buried records. This was the last expedition sent out to look for traces of Franklin. Later, Schwatka headed other exploring parties, in Alaska and in Mexico, and received honors from various scientific societies. He resigned his commission in the army in 1885, and in 1886 he ascended Mount Saint Elias to a height of 7,200 feet. See Polar Exploration.

Writings. Schwatka's published works include Along Alaska's Great River, Nimrod in the North, and Children of the Cold.

SCHWENKFELDERS, swenk' fel durz, one of the early groups of people who fled to America to escape the religious intolerance of the Old World. Thirty-four families emigrated from Silesia to Pennsylvania in 1734, and settled in Montgomery and Berks counties; others followed two years later. As their colony prospered, they established a school system (1764) and a denominational organization (1782). A recent census of American churches credited the Schwenkfelders with four churches, six ministers, 1,358 members, and six Sunday schools, with an enrollment of 2.160. The total amount raised each year for all religious purposes is not more than \$20,000. The church government is congregational, and the services non-liturgical. The views of the adherents, to a large extent, resemble those of the Quakers.

The sect adopted for itself the name of its leader, Kaspar Schwenkfeld (1490-1561), who did not accept certain of the ecclesiastical principles of Luther, especially those regarding the sacraments and ministry of the Word. He laid

special stress on the inner life.

SCHWYZ, shveets, the Swiss canton that gave its name to Switzerland. See SWITZERLAND (Government).

SCIATICA, si at' ih kah. See NEURALGIA.

SCIENCE, GENERAL, a course in applied science offered as a part of the program of studies in many public schools in the United States. It is usually placed in one or more of the grades from the seventh to the ninth, and serves as a connecting link between nature study in the lower grades and the special sciences in the high school (see, in these volumes, the article NATURE STUDY). Work in general science is of comparatively recent development. It has grown out of the need for practical science instruction in an age when science is so large a factor in everyday life.

General science had its origin in a sharp reaction from the highly specialized science which was taught in the high schools during the closing years of the nineteenth century. There was a feeling that this work was not suited to the interests and needs of the pupils. It was too formal and technical, and too remote from practical affairs. What was needed was something that would help pupils to understand and interpret the facts of their own environment. Scientific knowledge is closely related to most of the essential phases of mod-

ern life, such as health and sanitation, home interests, vocations, and recreations. Therefore, young people should be given the kind of instruction that would serve to guide them in dealing with these fundamental considerations.

If this principle be accepted as the purpose of the general-science course, certain conclusions follow as to the topics to be studied, their organization, and the method of their study.

In the first place, in dealing with factors of environment, it is evident that the course cannot be limited to any one science. Since the phenomena of everyday life come to us unclassified, our investigation of them will carry us into more than one subdivision of science. Some of the questions which possess civic and economic importance are topics like the following: methods of lighting, heating, and ventilation and their relation to health; the importance of sound in everyday life; new developments in methods of communication; problems of transportation; the press as a medium of conveying thought; man's use of electricity; how plants live and grow; the adaptation of animals to their environment; the economic value of plant and animal life; personal and community health; how water is obtained and used; how food, fuel, clothing, and shelter are obtained from nature; air, water, gas, and steam as the servants of man.

The answers to these questions, and many others like them, will range through the fields of astronomy, agriculture, physiology, biology, commercial geography, chemistry, domestic science, meteorology, physiography, and physics. But the inquiry will not cover systematically any one of these sciences; it will use only so much of them as is needed to give an

answer to the problem in hand.

But if such a wide range of topics is to be considered, in what order shall they be taken up? How shall the material of the course be organized? General science answers this question by providing that the topics shall be organized according to the need of the learner, rather than to a need for the logical arrangement of subject matter. It is less concerned with a systematic presentation of facts than with their appropriateness to the question in the pupil's mind. In other words, it favors a psychological, rather than a logical, organization. Since the basic consideration is the assisting of pupils to understand their material world in an orderly way, they must be led from item to item of a subject, until a satisfactory solution has been reached. This process is not contrary to the correct principles of reflective thinking, but is in complete accord with them.

The third and last distinctive feature of general science is its method, which is always the method of investigation or problemsolving. Special sciences are studied on the plan of requiring the pupil to prove facts that

have already been discovered. General science leads the pupil to define and solve his problems by means of original thinking. The problems may be suggested by the pupils, or discovered by questions propounded by the teacher, but in every case, they will represent real interests in practical situations.

The organization of courses in general science and their introduction into the schools are still in a partially experimental stage. But recent progress which has been made in the subject points to an increasing importance for this study in the immediate future. Science occupies so large a place in the life of the twentieth century that a knowledge of it is essential to every well-equipped citizen. It is in helping to supply this knowledge that general science may play an important part.

[A list of books on general science and its teaching may be found at the end of the article Nature Study and Elementary Science.]

SCIENCE AND THE SCIENCES. The questions "Why?" and "How?" probably have been asked more times in the history of the world than any others. These are favorite questions of children, and as even the wisest of men are but children in knowledge, man has been seeking answers to these queries from the time he began to investigate what goes on about him. The answers that men have found, the organized knowledge they have acquired by observation and reasoning, make up what we call the sciences. The name science comes from the Latin scio, meaning I know, and the scientist is one who knows what he knows through experiment and research.

The truly scientific student never jumps to a conclusion. No matter how logical an explanation appears, or how plausible a statement may be, he must treat it as an hypothesis, or supposition, until it is proved beyond doubt. He works from his knowledge of the universal law of cause and effect, which tells him that any set of circumstances always produces the same results, and that in nature there are no exceptions to a rule based on fact. An instance of the application of the law of cause and effect is the discovery of the planet Neptune, told in the article Astronomy. The complete orderliness of the universe, of which this discovery is an example, is the basis of all modern science, whether it deals with the stars in space or the body of man.

The Sciences. In ancient times, and even during the Middle Ages, there was little attempt to differentiate between the sciences, for scientific knowledge was limited. A distinction was drawn between the theoretical and the practical sciences, but that was in effect merely a distinction between what would to-day be called philosophy and science proper. Until modern times, the general term natural history

was in common use to describe the study of all life, whether plant or animal; while natural philosophy, or physics, included the study of all inorganic phenomena. As scientific knowledge increased, however, a more and more close classification became necessary. To-day, the sciences are divided and subdivided, and a student often specializes in a single subdivision of a science, while possessing only a general knowledge of the broader subject. Notwithstanding this subdivision and classification, however, scientists are coming more and more to realize the close relations existing between all kinds of natural phenomena.

The sciences named in the following list are not all coördinate in value; ethnology and ethnography, for instance, are branches of anthropology, while botany and zoölogy are divisions of biology. All, however, have the right to be considered as sciences, and all are treated under their proper headings in these volumes:

Algebra Geometry Mathematics Anatomy Meteorology Anthropology Archaeology Minerals and Mineralogy Arithmetic Numismatics Oceanography Astronomy Biology Paleontology Botany Philology Calculus Philosophy Chemistry Phonetics Economics Physical Geography Entomology Physics Ethnography Physiology Ethnology Psychology Sanitary Science Eugenics Geodesy Sociology Geography Trigonometry Zoölogy Geology

Under many of the articles above are given lists of scientists; thus the distinguished chemists whose biographies appear in these volumes are listed under CHEMISTRY, the geologists under GEOLOGY, and so on. Certain other scientists are indexed here:

Finsen, Niels Ryberg
Galton, Sir Francis
Henry, Joseph

Langley, Samuel P.
Loeb, Jacques
Metchnikoff, Elie

Pseudo-Sciences. This term is useful to describe the several pursuits which, according to one view, constitute the antecedents of modern science, and, according to another, show the survival of outgrown habits of thought and the persistence of the cruder products of inquiry. These beliefs and practices form a significant part of the history of thought, and of the struggle of men to guide conduct by knowledge. The pseudo-sciences arose as ambitious attempts to explain the world of things and events, and the unseen world of spirits and forces patterned upon the fears and desires of men. They proceed from rather vague notions to systematic conceptions; their logic is weak, and involves a confusion of wish and fact, of imagination and reality. The demand for proof is slight, and the satisfaction of belief urgent. At every stage, the mind reaches out for a complete solution, for some system of explanation that makes a whole out of detached happenings, and furnishes some sort of clue to the meaning of existence. In the course of such pursuits, a considerable body of observations accumulates; but these are held together by the system that is imposed upon them. At early stages, such lore is religion and philosophy and science in one; out of the notions thus favored, and thus developed by systematic interpretation, crudely scientific, the earlier pseudo-sciences arise. The later ones have a different history. The best-known of these, such as alchemy, astrology, palmistry, and others listed below, are treated separately in these volumes.

A common motive of these pursuits is the control of personal fortune by guessing the secret of its source; more directly, to read the signs of qualities and fate in the appearances of nature and of the human form. Primitive thinking looks upon the universe of things and events—the movements of nature, the sky and land and sea, and all that they contain—as a setting for human fate, and looks upon the forces in operation as acting after the manner of human motives. The insight into nature is so uncertain and perplexed that only some fortunate penetration of the mystery can avail. Weak analogies are accepted, and the body of tradition based upon them is carried forward in a cult of mystic practices.

Related Subjects. The following articles, if they do not all deal with pseudo-sciences, strictly so called, at least treat of closely related topics:

Alchemy Necromancy Astrology Occult Clairvoyance Palmistry Conjuring Phrenology Demonology Physiognomy Divination Psychical Research Faith Cure Psychoanalysis Horoscope Spiritualism Hypnotism Suggestion Magic Superstition Medium Telepathy Mesmerism Trance Mind Reading -Witchcraft

SCILLY, sil' ie, ISLANDS, a group of British islands about twenty-five miles from Land's End, on the coast of Cornwall, England. They are the first bits of land seen by passengers approaching England from New York. There are between 140 and 150 islands in the archipelago, of which only five are of any importance. The capital is Hugh Town, on Saint Mary Island. The combined area of the inhabited islands is 4,041 acres; the population is 1,732 (1931). On the islands are found many remains of Druid circles and barrows, and on the Isle of Sampson was found a perfect "kistvaen," or sepulchral chamber of stone.

The islands are wild and picturesque, with bold and rugged cliffs facing the Atlantic Ocean. The climate is extremely mild, and flowers that cannot grow anywhere in England are produced in great profusion. The inhabitants are chiefly engaged in fishing, flower-growing, and agriculture. In summer there is steamer connection with Cornwall, and tourists enjoy picturesque scenery. See illustration, page 232.

SCIMITAR, sim' ih tur. See Sword. SCION, si' un. See Grafting.

SCIOTO RIVER, si o' toh, a tributary of the Ohio River which drains the central part of the state of Ohio. It rises in the west-central part of the state, flows eastward, and then turns southward, emptying into the Ohio River at Portsmouth. Between 1832 and 1875, when the Ohio and Erie Canal was the chief transportation outlet of Ohio, the Scioto River became an important commercial route. It served as a feeder for the canal, which ran nearly parallel with the river from Columbus, the state capital, to Portsmouth. Throughout this entire region, the land is fertile and rich in mineral content.

SCIPIO, sip' ih o, the name of an aristocratic Roman family, two members of which achieved distinction in the wars against Carthage.

Publius Cornelius Scipio (237 B.C.-185 B.C.), called Africanus Major, is regarded as the greatest Roman general before Julius Caesar. He came into prominence when Rome was fighting the army of the great Carthaginian leader, Hannibal, in the Second Punic War. In 205 B.C., he was elected to the consulship, and a year later invaded Africa with a large army. At Zama, in the year 202, he inflicted a decisive defeat on the Carthaginians, and brought the war to a close. Scipio returned to Rome a popular hero, was accorded a triumph, and received the surname Africanus. (Major, meaning elder, was added to distinguish him from a younger member of the family [see below] who also won the surname Africanus.) Toward the close of his life, Scipio became involved in a political conspiracy, but on the day set for trial, he delivered an eloquent speech in which he reminded the people of the victory at Zama, of which that day was the anniversary. This stopped further proceedings against him, and he then retired to private life.

Publius Cornelius Scipio Aemilianus I (185 B.C.-129 B.C.), called Africanus Minor (the Younger), was a grandson of the elder Scipio by adoption. During the memorable siege of Carthage, the surrender of which ended the Third Punic War, he was elected to the consulship and given supreme command of the army in Africa. On the fall of the city, in 146 B.C., he returned to Rome, where he later held the office of censor. In 134 B.C., having been reëlected consul, he reduced the city of Numantia, in Spain, after the conquest of the Numantines had been attempted in vain by several consuls. Thereafter he devoted himself to political affairs, being one of the leaders of the aristocratic party.

Related Subjects. The following articles in these volumes will clarify some references above:

Carthage Censors Consul (Roman) Hannibal Punic Wars Triumph SCIRPUS, sur' pus, a member of the sedge family. See Bulkush.

SCIRRHUS, skih' rus. See CANCER (Derivation)

SCISSORBILL, siz' ur bill, or SKIMMER. a bird of the American side of the Atlantic, related to the gulls and terns. Its names refer to its characteristic bill and its method of seeking food. The bill is a thin, bladelike structure, with the lower mandible much longer than the upper. The bird obtains its food by skimming rapidly along the surface of the water, with its beak opened wide and the lower mandible thrust below the surface, thus scooping up insects, small fish, shrimps, etc. It holds its body at an angle while flying, to keep its wings from touching the water. The plumage of the scissorbill is black above, with a good deal of white tipping the feathers, and is pure white underneath. The nest is a depression in the sand, and the eggs, three to five in number, are white or buffy white in color, heavily blotched with chocolate.

Scientific Name. Skimmers constitute the family Rynchopidae. The common, or black, species described above is Rynchops nigra. There are four other species, inhabitants of the warmer regions of the earth.

SCLERA, skle' rah. See Eye.

SCLEROMETER, skle rom' e tur. See HARDNESS.

SCOGAN, $\mathit{sko'}$ gan, Henry. See Poet Laureate.

SCOPAS, sko' pas. See Sculpture (History: Greece).

SCORIA, sko' rih ah. See North Dakota (Coal and Clays).

SCORPIO, THE SCORPION, the eighth sign of the zodiac, whose symbol is M (see Zodiac). The constellation Scorpio appears in the southern part of the sky (see illustration The Heavens in Spring and Summer, under Astronomy). It contains the bright star Antares, the largest star known, which shines with a fiery-red light. This first-magnitude star has a companion of seventh magnitude, which is greenish. According to Greek mythology, the scorpion killed Orion; when the latter boasted that he would kill every poisonous reptile on earth, Diana sent the scorpion to sting him, and he died. The scorpion also frightened the horses of the sun when Phaethon (which see), the son of Apollo, endeavored to drive them. See Antares.

SCORPION. Because of their repulsive appearance and poisonous sting, scorpions are objects of dread to man. They belong to the same class as spiders, mites, and ticks, or the arachnids (see ARACHNIDA), and are found in warm countries in most parts of the world. There are about twenty species in the United States, but none farther north than Nebraska.

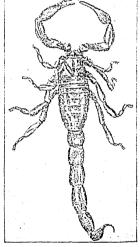
The scorpion's sting is dealt from a curving organ on the last segment of the tail. Two glands at the base of the segment secrete a



poisonous fluid that flows out of two pores, and the wound inflicted by the animal is exceedingly painful, though not usually fatal. The poison should be sucked or squeezed out of a wound, and the spot should be bathed with ammonia.

The body of a scorpion consists of two divisions—a short, forward part, made up of the head and thorax, which are united; and a long abdomen, the last five Two VIEWS OF THE SCORPION segments of which

form a slender tail. On the front end of the body, called the *cephalothorax*, there are two pairs of appendages bearing pincers, and four

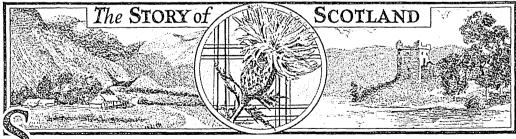


appendages resemble the claws of a lobster. The number of eyes varies in different species from six to twelve. On the abdomen are found the breathing pores. All scorpions produce their young alive, after being hatched in the mother's body. The newly hatched young stay with the mother for several days after birth, clinging to her body with their tiny pincers. Scorpions feed on large insects and spiders, and are chiefly active at night. They are usually black or yellowish in color, and range in length from half an inch to eight inches. SCORPION FLY, the common name of

certain insects that scientists place in the order Mecoptera; the name means long-winged. The scorpion flies are one-half inch or more in length, and have two pairs of netted wings as long as the body. They are not true flies, all of which belong to the order Diptera (twowinged). The body of the male scorpion fly ends in two slender, pincer-like appendages, somewhat like a scorpion's sting, whence the common name. These pincers can be used as forceps for clasping objects, but they are not a stinging organ, such as the scorpion possesses. The life history and habits of the scorpion flies are not well understood, but they are believed to feed on dead animal matter and to lay eggs in crevices in the ground. The larvae, which resemble caterpillars, hatch in about a week See Insect (Classificaand grow rapidly. tion).

SCOTCH COLLIE. See Collie. SCOTCH (officially Scottish) TERRIER, a breed of dogs originating in the Scottish Highlands. The standard Scottish terrier is small, weighing from eighteen to twenty pounds, and has a rough, coarse coat, small, upright ears, long muzzle, and tail carried erect. The hair is dense and wiry, and in color is brindle, black, grizzly, or sandy. These terriers are alert, active, and excellent vermin Being intelligent and affectionate, fighters. they also make ideal house dogs. See illustration under Terrier; see also, Dog.

SCOTCH VERDICT. See JURY AND TRIAL BY JURY (Petit Jury).



COTLAND, a geographical division of the United Kingdom, occupying the rugged northern part of the island of Great Britain, and including the Hebrides, Orkney, Shetland, and other islands. This country was called Caledonia by the Romans, and later received the name of Scotland from the Scots, an invading tribe from northern Ireland, which region anciently was known as Scotia. The stern and wild beauty of this—

"Land of brown heath and shaggy wood, Land of the mountain and the flood,"

its warring clans, and its hardy heroes, have been celebrated in legend, poetry, and song.

Size and Location. Scotland is separated from England by the Solway Firth, the Cheviot Hills, and the River Tweed; on all other sides it is bounded by arms of the sea. Including its 186 islands and 609 square miles of inland waters, Scotland has an area of 30,405 square miles; it is about as large as the state of South Carolina, or as New Brunswick and Prince Edward Island combined.

People, Religion, Language, and Cities

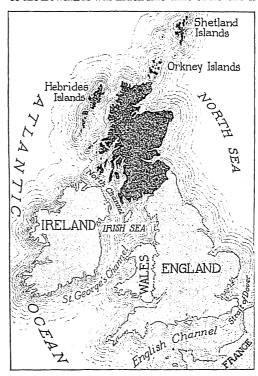
The People. A rugged land, vigorous climate, and lack of great wealth have developed the hardy Scotsman. The brawny Highlanders, the tallest people in the world, averaging from five feet eight inches to six feet in height, and their thrifty brothers of the Lowlands, inherit from their warring ancestors their loyalty to country and clan, their frugality, and their energy. Although the Scots are a practical and serious people, their history is full of romantic and heroic legend. The national dress of bright plaid kilts is still worn by the Highland troops, and town and countryside still echo to the noisy, strange music of the bagpipe, which long ago replaced the harp of the ancient bards. Bands of Highland troops in their kilts performed some of the most daring feats in World War I, and a regiment of Scottish-Canadians won from their German opponents the name "Ladies from Hell." The clan system, which in no other European country has played so conspicuous a part in history, is still important in the social life of the more remote parts of the country.

More than one tenth of the population of the United Kingdom is in Scotland. The number of inhabitants, which is 4,842,554 (1931), is less than that of California, but exceeds that of either Quebec or Ontario, the largest Canadian provinces. In the Highland districts, the population is scattered, but the Lowland region near the great cities of Glasgow and Edinburgh is one of the most thickly inhabited districts of Great Britain. Almost the entire population is native Scotch; only 7 per cent are of Irish and English birth, and less than 1 per cent are foreigners. The Scots are practical people, interested in politics and business, and the townward movement from the rural area is increasing; more than three fourths of the people are inhabitants of burghs and cities, the largest of which is Glasgow, with over a million inhabitants. The agricultural communities, especially, have suffered from large emigration to the United States and to distant British outposts, principally Canada, "the Scotland of America.'

Religion. The Scots are natural philosophers and theologians. Scotland is the home and stronghold of Presbyterianism, and most of the inhabitants are members of the Church

of Scotland, which in its present form dates from its union with the United Free Church in 1929. Among the lesser Protestant denominations are Methodist, Congregational, and Episcopal churches, and certain small dissenting Presbyterian bodies. The Catholic church has had a considerable growth in recent years, due chiefly to immigration from Ireland.

Language and Literature. Until the fifteenth century, a distinct Scots, or Gaelic, tongue was spoken in the Highlands, but the dialect of the Lowlands was much like that of northern



For political map and map data of Scotland, see Great Britain (map).

England. This Gaelic tongue, affected by the Latin and French influence of the fifteenth and sixteenth centuries, remained the national language of the Highlanders until the union with England. Although the ancient Scottish ver-

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nacular may still be heard in many communities, and there are various dialects in different localities, the modern language of Scotland is

English.

Until the eighteenth century, Scotland had a distinct national literature. The ballads and songs of the bards, the Romances and Prophecies of Thomas the Rhymer, the tales of The Bruce by Barbour, and stories of the deeds of Wallace by "Blind Harry," exerted a great and lasting influence on the work of the later poets of both Scotland and England. James I, Dunbar, Douglas, and Lyndsay are prominent Scottish poets of the fifteenth and sixteenth centuries. The later writers of Scottish birth, including Robert Burns, Sir Walter Scott, James Hogg, Joanna Baillie, George Mac-donald, Robert Louis Stevenson, John Watson (Ian Maclaren), and James M. Barrie, are worthy of study. Most of these writers are discussed either in the article on English literature or in separate biographical articles.

Education. Scotland surpasses all other parts of the United Kingdom in the excellence of its elementary and secondary educational systems. The many religious and civil struggles of the country did not prevent the early provision for public instruction. In 1872 the Scottish Educational Department was created, and boards having charge of elementary and secondary schools were elected in every burgh and parish. This system of parochial and burghal schools was superseded in 1918 by government provision; even food and books may be provided for the children. Unlike England, Scotland has never had many private

boarding schools.

The growth of technical education in recent years has been remarkable, both in towns and rural districts. The Royal Technical College at Glasgow, the largest institution of its kind in the British Empire, and among the most important in the world, is the center of tech-

nical education.

Scotland is a leading country in education. Its four universities have an attendance which is larger in proportion to the whole population than that of England with its eleven universities. Women are admitted on the same conditions as men, and university education costs much less than in England, qualified persons being entitled to assistance. The universities are aided by the government, and by the annual income from a \$10,000,000 trust fund, the gift of Andrew Carnegie. These universities are Saint Andrews, founded in 1411; Glasgow, 1450; Aberdeen, 1494; and Edinburgh, 1582. The National Library of Scotland was instituted in 1925.

The Cities of Scotland

Edinburgh, the capital, and Glasgow, the largest city, are described under their own titles. The remaining cities of importance are

Aberdeen, the fourth largest city and county town of Aberdeenshire, lies on a bay of the North Sea, 130 miles northeast of Edinburgh. It has an excellent harbor, and is the principal northern port of Scotland.

Aberdeen is one of the most beautiful cities in Great Britain. It is sometimes called the "Silver City by the Sea," because of its gray-gleaming buildings constructed of granite quarried in the vicinity. Union Street, its principal thoroughfare, though less famous than Pall Mall, Unter den Linden, or Champs Elysées, is one of the handsomest avenues in Europe. Attached to the art gallery and museum is a domed court called "Hall of Remembrance," erected as a World War Memorial; King George V officiated at the opening in September, 1925. The University of Aberdeen is a leading institution of the city. Like Glasgow, Aberdeen is famous throughout the world for the extent to which it has carried municipal ownership.

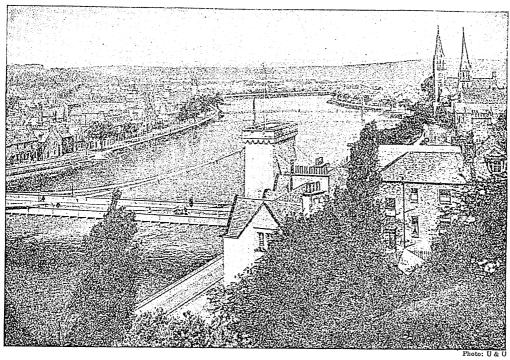
Aberdeen was a prosperous community as early as the twelfth century, but it suffered much in the wars between England and Scotland, and its present prosperity dates only from 1818, when the rediscovery of methods for polishing granite laid the basis for a new industrial de elopment. Granite in all forms, both polished and in the rough, is a leading item of export. The city is the great fishing center of northern Scotland. It is noted also for its manufacture of woolen, cotton, jute, and linen goods, its distilleries, and its jam factories. Population, 167,259 (1931).

Ayr, air, a seaport, summer resort, and county town of Ayrshire, is famed for its associations with the poet Robert Burns, whose birthplace, the village of Alloway, lies two and one-half miles to the south. The old town of Ayr, numbering 36,784 (1931) in population, lies at the mouth of the River Ayr, on a beautiful bay of the Firth of Clyde, the shining, sandy beaches of which are an attraction to thousands of visitors each summer. Near by are a famous race course and a popular Scottish golf club. About forty miles to the northeast is the city of Glasgow.

Ayr itself is rich in historical associations. In the twelfth century, it was made a favored residence of the Scottish kings, and during the wars for independence was the scene of many fights between the English and the followers of William Wallace. There still stands the famous old Saint John's Church, where in 1315 the Scottish Parliament met to confirm the succession of Edward Bruce to the throne.

The chief interest in the locality, however, centers about the outlying village of Alloway. The "auld clay biggin," the cottage where Burns was born, still stands (see picture which accompanies the article on the poet). Near by is the "auld haunted kirk," now without a roof and deprived of all of its woodwork by relic-hunters. On the banks of the river that Burns so often refers to as the "bonnie Doon," a monument to the poet has been erected, and a grotto close by contains the sculptured figures of Souter Johnnie and of Tam O'Shanter, characters that figure in the poetry of Burns.

Dundee, a seaport in Forfarshire, on the eastern coast, is situated on the north shore of the Firth of Tay, fifty miles northeast of Edinburgh. A splendid esplanade marks the river bank. The city is built of granite, which is extensively quarried in the vicinity. Dundee is the center of the British jute trade, and also produces more linen goods than any other town



A VIEW OF INVERNESS

in Scotland. The confectionery and marmalade of Dundee are celebrated. Shipbuilding and engineering are important industries. Whaling and seal-fishing, which were once more important than now, are centered here. At Dundee is one of the naval airplane stations of Great Britain.

Dundee is an ancient city, figuring prominently during the almost constant struggles between England and Scotland. It was twice burned in this early period, but is now the third largest city in Scotland, with a population of 175,583 (1931). A United States consul is resident here.

An iron bridge, over two miles long, spans the entrance of the Firth. Recently, an obelisk was erected on Law Hill as a World War Memorial.

Dunfermline, dun ferm' lin, an ancient city of Scotland, in the County of Fife, lies sixteen miles northwest of Edinburgh. The name is Gaelic, and means fort on the crooked linn. It was an important place before the days of the Norman conquest of England (1066), and is full of interesting historical remains. It was a favorite residence of early Scottish kings, and the birthplace of James I, and of Charles I of England. Daniel Defoe described Dunfermline in the eighteenth century as showing the "full perfection of decay"; but the city began to acquire importance in 1718, when the weaving of damask was introduced by a man who, by pretending to be an idiot, had gained entrance to workshops in Edinburgh and learned the strictly guarded secrets of the art. Dunfermline soon surpassed Edinburgh and all other towns in Great Britain in the quality and design of its damask, for which it is still noted.

Andrew Carnegie was born in Dunfermline in 1835, and was the town's greatest benefactor. The Carnegie Dunfermline Trust, which he established in 1903 with \$3,750,000, was intended to offer an income to

be spent to bring "sweetness and light" to the community. Pittencrieff Park, which he donated at another time, was to be maintained by this fund. Through this benefaction have been established a clinic, a craft school, a school of music, and a physical-training college; and the public library, the baths, and other interests—educational, literary, and artistic—have been aided. Population, 34,954 (1931).

Inverness, the county town of Inverness-shire, and a railroad center, about 120 miles north of Perth, on a fine harbor formed by the mouth of the Ness. It is the most important town in the Highlands, and the center of the Highlands trade, particularly as concerns sheep and wool.

The town is old; the site is mentioned as early as 565, when Columba visited the vicinity to convert the king of the Picts to Christianity. It was chartered in 1214. Population, 22,582 (1931).

Leith, losth, the seventh largest town before 1920, was in that year joined to Edinburgh. The two towns had grown into one municipality, and Leith, with 80,000 people, surrendered its identity.

Paisley, payz' lie, is situated in Renfrewshire, on White Cart Water, seven miles southwest of Glasgow. It is one of the world's chief centers for the manufacture of cotton thread, and is the headquarters of the widely known Coats and Clark thread factories. The manufacture of the famous Paisley shawl, once a rival of the Cashmere in the markets of the world, was a flourishing industry in the nineteenth century.

Paisley is a modern, progressive community, with fine public buildings, many parks and recreation grounds, a famous race course, museums, public baths, libraries, and numerous manufactures. One of the chief points of interest is a restored portion of an abbey founded in the twelfth century. Population, 86,441 (1931).

Physical Features

The Land. The Northern Highlands, occupying one third of Scotland, are a region of parallel, craggy ridges extending from northeast to southwest. They are furrowed and trenched by deep glens, through which flow rapid torrents and cataracts, and in which lie deep mountain lakes. The rugged mountain crests form natural battlements and turrets. Their precipitous slopes are roughened by bosses and corries, or caldron-like hollows scooped out by the streams. Their

deep ravines are dark with dense woods of pine and Many of birch. the summits of the Eastern High-lands are broad, undulating moors, and it is said that, in this region, there is more level land on the mountain summits than in the valleys. As one journeys westward, the peaks become higher and more craggy. The Grampian Hills in the west. the loftiest mountains of Scotland, are separated from the Northern Highlands by Glenmore, a deep glen which

stretches across the country from sea to sea. Here Ben Nevis, the highest mountain of Great Britain, rises to an elevation of 4,406 feet. The deep glens, craggy peaks, lovely moors, and beautiful lakes, once echoing to the din of Highland battle, have become famous through Scott's Lay of the Last Minstrel, Marmion, and The Lady of the Lake.

The Central Lowlands, a region of grassy slopes and dells, rippling brooks, and wooded hills, lie between the Highlands and the Southern Uplands (see below). They resemble the rolling fields of England, and form the richest mineral and agricultural region of Scotland. In this region dwell nearly three fourths of the population.

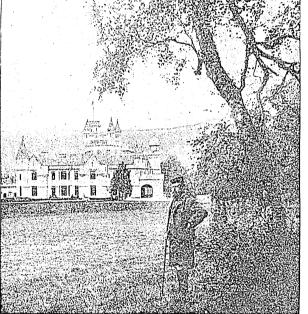
Rising abruptly to the south are the Uplands, a rolling table-land of grassy moors, broken by low, verdant mountains and a few bare precipices. The grassy heights furnish pasture land for large flocks of sheep; in the valleys, grains and other crops are grown.

South of the Uplands are the Cheviot Hills, famous in border warfare.

The land is penetrated by many inlets, or sea *lochs*, and few places are more than forty miles from the sea. Because of the remarkable irregularity of the coast line, Scotland, though smaller than England, has more miles of seacoast. On the west the cliffs rise from the sea in a great rock wall, in some places projecting in rough piers and buttresses; in

others, they are cut by deep, narrow fiords resembling those of Norway. Tall pillars of rock. called stacks, are often left standing alone amidst the waves, and are the lonely habitation of myriads of sea birds. Numerous islands border this western coast, including the Hebrides and the Isle of Skye. The largest of the sea lochs penetrating the west shore are the firths of Lorne and Clyde.

On the east coast, the Firth of Forth and Moray Firth extend far inland. These inlets and the Firth

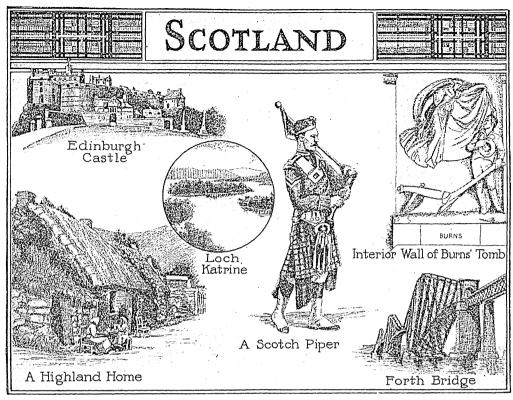


A SCOTCH LAIRD AND HIS CASTLE

of Tay are bordered by low, sloping beaches, but in the south, the Uplands plunge boldly to the sea, and a few rocky cliffs rise between the sandy beaches to the north. Caithness, in the extreme northeast, meets the sea in a broad, level moor. The rocky Orkney and Shetland islands are the only groups off the north coast.

islands are the only groups off the north coast. Rivers and Lakes. The most important commercial river of Scotland is the Clyde, upon which Glasgow is situated. This river flows into the wide Firth of Clyde, an inlet of the Atlantic Ocean, but the other large rivers of Scotland flow east to the North Sea. Among these are the Tay, which has a greater volume than any other river of the British Isles, the Tweed, Forth, South Esk, Don, Dee, Spey, and Findhorn. Among several small rivers of the west coast are the Ayr and the Doon. The Nith flows into Solway Firth, an inlet of the Irish Sea.

The Highland streams rush through deep, narrow gorges, and over rocky ledges in foam-



ing cataracts. In the central and southern regions, the rivers are bordered by high, grassy banks and braes.

The central and western portions of the country are studded with a multitude of beautiful lakes, ranging in size from picturesque Loch Lomond to the numerous small rock tarns nestling in the western mountains. Among these lakes, noted for their beautiful scenery, are the lonely and wild Loch Skene of the Southern Uplands, the Lowland Lake of Menteith, and Loch Katrine, of which Scott wrote, in The Lady of the Lake:

Where, gleaming with the setting sun, One burnished sheet of living gold, Loch Katrine lay beneath him rolled; In all her length far winding lay, With promontory, creek, and bay, And islands that, empurpled bright, Floated amid the livelier light, And mountains, that like giants stand, To sentinel enchanted land.

Climate. Owing to the warm waters of the Gulf Stream, which washes the west shores of the British Isles, the west coast of Scotland is milder in winter and cooler in summer than the east coast. The North Sea has a moderating influence upon the climate of the eastern shore, but in a much smaller degree. Summers are cool throughout Scotland, and winters are cold, especially in the inland districts, where the mountains and uplands are covered with snow three months of the year. Much of the moisture of the prevailing Atlantic winds falls on the Western Highlands, where the annual precipitation is excessive, averaging 100 inches, and on the summit of Ben Nevis reaching 150 inches. The eastern section is comparatively dry, especially in those districts protected by the highest western mountains, as in Tweedale, East Lothian, and the lowlands of Moray Firth, where the annual rainfall averages but twenty-six inches.

Resources and Industries

Agriculture. Less than one sixth of this mountainous country is arable land, and this is confined chiefly to the Lowland districts. The farm lands, as in England, are parts of large estates, and are rented to farmers whose families have usually held the same land for generations. This system has been a severe handicap to the capable Scots, but when the pres-

ent leases expire, the Smallholders' Act of 1911 and the Land Settlement Act of 1919 will do something to break up this historic land system. Ex-service men with small capital may obtain a holding of fifty acres, and the large private tracts, reserved as deer forests, will be opened in part to cultivation. Scotland now has over 50,000 holdings of less than fifty acres.

Although farming is not pursued upon an extensive scale, intensive cultivation of available land produces large yields of cereals and vegetables. Oats, the chief food of the Scottish farmer, is by far the most important crop. Turnips, used as stock food, potatoes, barley, and hay are raised in large quantities. Orchard and small fruits are cultivated, especially in

Clydesdale, and market gardening is important near the large cities.

The grass-clad moors of the Uplands and Highlands, covering almost one half of the total area of Scotland, are used for grazing, and stock raising is an important industry. Fine breeds of cattle, such as the Kyloe, Ayrshire, Galloway, and Polled Angus, are native to the Scottish Highlands. The Cheviot Hills and Highlands are famous for their sheep, the number of which is over six

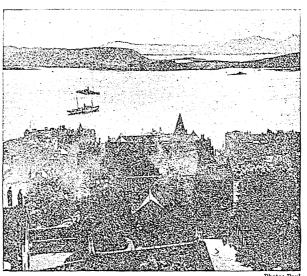
times that of the cattle raised. The Clydesdale draft horse and the Shetland pony are also famous Scottish stock.

Fisheries. Owing to the proximity of all parts of Scotland to the sea, and to the numerous sheltered fiords, lochs, and wide-mouthed rivers, as well as inland lakes and streams, fishing has been one of the important sources of livelihood of many of the inhabitants. The replacement of sailing craft by steam trawlers and motor vessels in the fishing industry is forcing out the poor private fisherman, who is not able to compete with the well-equipped boats owned by large companies. The salmon, whale, and seal fisheries are now chiefly controlled by large companies, and many Dutch and Norwegian vessels fish in Scottish waters. The most important catches are cod, herring, and haddock. Aberdeen is the center of the fishing industry. The Fisheries Board for Scotland regulates the industry.

Mining. The large fields of coal and iron in the central plain of Scotland are the foundation of the national industry. Great quantities of coal are mined in Fife and Lanark counties, in the latter of which Glasgow is situated. Ayr and Renfrew counties produce much of the iron product. From Linlithgow County are taken millions of tons of shale,

which yields great quantities of shale oil. An increasing demand for this oil is assured by the substitution of liquid fuel in place of coal in the British navy. Granite, limestone, slate, fire clay, and lead are of importance.

Manufactures. In the nineteenth century, Scotland's industrial interests superseded agricultural activities, and over one fourth of the



A VIEW ON SCOTLAND'S OBAN BAY
A sunset view on the west coast of Scotland. Outlined in the distance are the western isles.

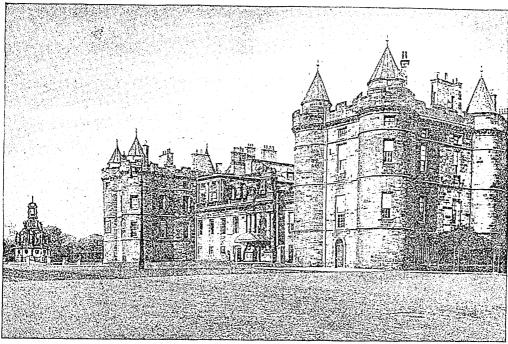
population are now engaged in manufacturing and in the coal and iron industries, a proportion which is exceeded in few countries. The iron production and maritime advantages of the country have developed the largest shipyards of the world along the Firth of Clyde, and made great shipbuilding centers of Glasgow, Leith (now a part of Edinburgh), Aberdeen, Grange-mouth, and Dun-dee. The great vessels of the Cunard Line and fa-

mous yachts are built in the Clyde yards, which were an important center of construction in the World War, and many merchant vessels are constructed in the yards of the east coast.

Glasgow is also the center of the large iron and steel industry. Scotland produces about one seventh of the pig iron of the United Kingdom. Whisky distilleries are widely scattered throughout the country. Glasgow has important chemical industries, and the manufacture of paper, glass, gloves, and hosiery is also carried on.

As in England, the textile industry shows a slight decline, but it is still one of the chief manufacturing industries. Scotch yarns and woolens, including tartans, plaids, and shawls, especially those manufactured in the district of the Tweed, are famous for their excellence. Linens and cottons are also extensively manufactured, the latter especially in the vicinity of Glasgow, and lace weaving and the manufacture of silk are increasing in importance.

Transportation and Commerce. There are about 4,000 miles of steam railroad in Scotland, and there is a complete tramway system connecting the important industrial centers of the Lowlands. The improvement of Scottish highways has been regulated by law since the twelfth century, and the roads are kept in



HOLYROOD CASTLE, EDINBURGH

Photo: U & U

repair by annual government grants. Motor transportation of both passenger and freight class threatened the railway companies with great losses, and in 1928 the British Parliament allowed the railways to operate their own vehicles on the highways throughout Great Britain, to offset the competition.

There has been much improvement in water transportation. An extensive system of canals intersects the country, including the Caledonian Canal, extending navigation across the country in the north-central section; the Forth and Clyde Canal, opening a waterway from sea to sea, and passing Glasgow; the Union Canal; and also the Crinan. Leith (part of

Edinburgh), Dundee, Grangemouth, and Aberdeen are large east coast ports, and Glasgow, Greenock, and Kilmarnock are important western commercial ports, of the Firth of Clyde.

As in the other divisions of the British Isles, the coasting, foreign, and colonial trade is large. Great quantities of coal are exported from Glasgow and ports on the Firth of Forth, and iron and textiles are also sent out. Many of Scotland's imports are brought into the country by rail through England, and as a result, the value of goods entering Scottish ports is less than one eleventh of that brought into English ports. See GREAT BRITAIN (Commerce).

History and Government

Early Inhabitants. At the time of the Roman invasion of North Britain, 78-82 A.D., Caledonia, or that region north of the Forth and Clyde rivers, was occupied by a composite race which is believed to have descended from early Celtic invaders and a still older non-Aryan people. These Caledonians were later called Picts, and were the ruling people of North Britain when it was invaded by the Scots in the sixth century. The Teutonic Angles invaded the southeast and Lowland regions; and Scotland's early history is a story of the Northern Highlands, and Scots, and the heathen Teutonic invaders. The Scots were Christians before their invasion of Caledonia, and the

Picts were converted by Saint Columba, a Celtic missionary who came from Ireland about 563.

Establishment of the Kingdom of Scotland. In the ninth century, the Picts and Scots were united under Kenneth MacAlpin, king of the Scots, and, a hundred years later, this kingdom became known as Scotland. Until the eleventh century, the country was chiefly occupied in wars with the Angles and with the Norsemen, who had settled in the Orkney, Shetland, and Hebrides islands. Revolts and intrigues against the king were frequent among the mormaors, the rulers of the various Scottish provinces, and the toisechs, or tribal chieftains.

The purely Celtic monarchy ended with the



Photo: U &

BAGPIPERS OF THE ROYAL SCOTS GUARDS

In the center, the old-style headdress is seen. At left and right the men are wearing the black-feather headpieces issued to the Guards' pipers by order of King George V.

accession of Malcolm Canmore (1057), after the death of Macbeth. The growing English influence in Scotland was strengthened by the king's marriage to an English princess. He made several raids into northern England, but was, at length, forced to submit to William the Conqueror and to become his man.

The feudal system in Church and State spread over Scotland in the twelfth century. David I (1124-1153), called the "Maker of Scotland," reformed justice, established towns and bishoprics, replaced Scottish lords and churchmen by English and Norman nobles, and acquired certain feudal rights to Northumberland by conquest. In 1175 the Scottish king, William the Lion, was captured in an invasion of England, and for the next fourteen years, Scotland was a feudal dependency of England. William's son, Alexander II, renounced his claim to the northeastern shires of England for a yearly payment of about \$1,000; his successor, Alexander III, recovered the western islands from the Norsemen by treaty (1266).

The Struggle for Independence (1286-1328). Although the English kings claimed an over-

lordship over Scottish rulers, the latter, except William the Lion, paid homage for their English possessions only. After the death of Alexander III, there were thirteen claimants to the throne, and Edward I of England claimed the right as overlord to appoint the successor. The Scottish nobles revolted against Edward's pretentions and forced John Baliol to enter into an alliance with France. Edward then invaded Scotland, and as a result of his victory at the Battle of Dunbar, declared himself king. The native Scots rallied under William Wallace, a popular hero of Scottish history, and defeated the English forces at Stirling. The long and cruel wars of independence which followed ended in the victory of the Scots under Robert Bruce in the Battle of Bannockburn, in 1314.

Power of the Nobility. Bruce was crowned king, but the struggles with rival claimants to the throne were not ended. During the reign of his son, the child king, David II (1329-1371), a descendant of John Baliol, supported by Edward III of England, claimed the throne. Added to the perpetual warfare on the English border were the feuds between the powerful clans and the long struggle between the house

of Douglas and the Crown. During the reigns of David and his successors, Robert II and Robert III, the powerful nobles were virtually the rulers of Scotland. Robert II was the first

of the Stuart dynasty.

Order was restored, the nobles were subdued by James I (1406-1437), and the Scottish-French alliance was renewed. However, during the succeeding reigns of James II and James III, history repeated itself in the renewal of feud, murder, and anarchy. James IV, through his alliance with France, then at war with England, invaded Northumberland, and was defeated and killed at Flodden Field in 1513. James V and his daughter, Mary, Queen of Scots, continued the alliance with France; this policy and their Catholic faith made them unpopular in Scotland. [The romantic and tragic life of Mary Stuart is given in detail under the heading Mary Stuart.] During most of her reign, the court of Scotland was the center of plot and intrigue.

the center of plot and intrigue.

Religious Struggles. The religious Reformation in England spread to Scotland, reaching its height in 1559 and 1560, under the leadership of John Knox. In 1560 a Reform Party Parliament assembled and established a na-

tional church of the Reformed type.

The religious struggles and plots of intriguing ministers continued during the reign of Mary's son, James VI. In 1603 he left Scotland to become James I of England, and from this time, Scottish history is closely related to that of England (which see). Both James and his son, Charles I, attempted to draw the two countries into closer union and to reorganize the church on an episcopal basis, thus adding to their unpopularity among the Scottish Presbyterians. See Covenanters, page 1726.

In the civil wars in England, 1642-1649, when Cromwell and the Parliamentarians defeated the Royalists and executed Charles I, the Covenanters supported Parliament. After the Restoration, in 1660, Charles II attempted to re-establish Episcopacy in Scotland, and the strict Covenanters were cruelly persecuted. They joined the English Revolution of 1688, and proclaimed William and Mary as their sovereigns. Presbyterianism was restored, but during the following reign of Queen Anne, the ill feeling between Scotland and England increased, and England saw that a union was necessary to preserve peace.

union was necessary to preserve peace.

Union with England. Not without violent opposition in the Scottish Parliament, the Articles of Union were passed in January, 1707, and the two kingdoms were united under the name of Great Britain. It was provided that the Presbyterian Church of Scotland be maintained; that sixteen Scottish lords and forty-five members of the House of Commons be elected to the Parliament at London; that all rights of trade and citizenship be the same for

Scottish and English subjects; that Scottish property laws, customs, and private rights remain unchanged.

Recent Period. Scotland has, without doubt, benefited from the union with England; in the course of time the country passed from a state of feudal warfare to the peace and order which characterized England. The country has never made any aggressive attempt to re-establish "Home Rule." However, in recent years there has been a revival of national



THE FLAG OF SCOTLAND
[See color plate of British flags, in article Great Britain.]

feeling which has been reflected in the renewed interest in Scottish customs, language, and literature. There is also widespread feeling that the Scottish department of government should be situated in Edinburgh, rather than in London. The Scottish troops distinguished themselves for their loyalty and gallant action throughout World War I, winning special recognition for their conspicuous bravery in the Battle of Loos, in the second Ypres battle, at Longueval, and Messines. See WORLD WAR II.

The years following the war were marked by changes in regard to land tenure, educational policies, and ecclesiastical movements, already discussed. A political change worthy of note is the passage of the Representation of the People Act (1918) which almost trebled the number of voters, by extending the franchise to women thirty years of age or over, and to certain classes of men twenty-one or over who were formerly not able to vote. In 1928 an act was passed giving suffrage to qualified women twenty-one years of age.

Government. Scotland is represented in the British Parliament by sixteen of its peers in the House of Lords, and seventy-four members in the House of Commons; of the latter, the counties elect thirty-eight members, the burghs (towns) thirty-three, and the universities three. The administrative department for purely Scottish affairs is known as the Scottish Office. Its responsible head is the Secretary of State for Scotland, a member of the British Cabinet, who is assisted by the Lord Advocate and the Solicitor-General for

OUTLINE AND QUESTIONS ON SCOTLAND

Outline

I. Location

- (1) Latitude, 54° 38′ to 58° 41′ north (2) Longitude, 1° 45′ 32′′ to 6° 14′ west
- (3) Relation to England
- (4) Islands

II. Size

- (1) Actual, 30,405 square miles
- (2) Comparative

III. Surface and Drainage

- (1) Northern Highlands
 - (a) Grampian Hills
- (2) Central plain
- (3) Southern Uplands
- (4) Broken coast line
- (5) Rivers
- (6) Lakes
- (7) Scenic features

IV. Climate

- (1) Influence of Gulf Stream
- (2) Unequal distribution of rainfall

V. Industries and Resources

- (1) Agriculture
 - (a) Only one sixth of land arable
 - (b) Land system
 - (c) Chief crops
- (2) Stock raising
- (3) Fisheries

- (4) Minerals
 - (a) Coal and iron
- (b) Other yields
- (5) Manufacturing

VI. Transportation and Commerce

- (1) Steam railways
- (2) Tramways
- (3) Water transportation
- (4) Coastwise and foreign trade

VII. The People

- (x) Physical characteristics
- (2) Customs
- (3) Distribution of population
- (4) Education
- (5) Religion
- (6) Language and literature
- (7) Cities

VIII. Government and History

- (1) Central government
- (2) Local government
- (3) History
 - (a) "Caledonia"
 - (b) The coming of the conquerors
 - (c) Establishment of kingdom and struggle for independence
 - (d) The Stuart kings
 - (e) Era of religious struggles
 - (f) Union with England
 - (g) Later history

Ouestions

How does Scotland's largest river rank among the rivers of the British Isles as volume?

What musical instrument and what article of dress belong only to the Scottish

What and where are the *stacks*, and what form of life is to be found on them? What island gave to Scotland its name and its Christianity?

How does the country compare in number of inhabitants with the American state and the Canadian provinces which it most closely resembles in size?

Who were the "Ladies from Hell," and why were they so called?

Name four writers whose works make up an important part of English literature, but who really belong to Scotland.

What and where is the loftiest peak in Great Britain? How high is it? What part have the Cheviot Hills played in history and in literature?

Why has the western coast of Scotland a more temperate climate than the eastern coast?

What industry has been affected by the change in fuel in the British navy? Who is the "popular hero of Scottish history," and what did he accomplish?

Socialit. both members of the government. but not in the Cabinat. Other Scottish Regiments are the Scottish Board of Realth. The Separal Board of Courts from his board of Imary, the Scottish Education Department, the Board of Agriculture, and the Fishery Board. The Scottish Office and the Education Department, the Board of Agriculture, and the Education Department are located in Location; the other department are located in Location; the other departments have offices in Edication. Under the terms of the Local Government (Scottant) Act of 1920, local affelia are managed by noting founding and town countils. The burghs, or towns, are thankful as farge or family burghs, the former being those with 20,000 population or more and the small burghs are administrated by the respective county countils. The town countils of large burghs, and the county councils, are now the local authorities for poor rede, publichealth services, town planting, road maintenance, police, valuation, and linear-law administration. The education and maintenance is before, and statutory committees are appointed for police, poor rede, and education. The countils are elected; chairmen of county countils are as official chairmen of county countils are as official planting of the peace.

Relaxed Suffects. The reader who is interested in Scotland will had much information in the following articles:

DETERMINED TO THE VESS Eilebergh Grein: Green Glasgov III.5 Cheviot Eills Grampian Ells HETHLY Bellin, John de James (I, England) Enun, John Manheth Elimonichem Ernne, Dribert May Stuart Caledonia Edward (I. II., III. Title: Englina) Prestyterions William, Sir William England Gren Drittin TELLARIDE Embrides Shetland Islands Orkney Islands 1.43705 Lamond, Lock Lutine LEADERS FEDERALS Cantle DETS Corl Shale Coi Sheep Fish Steel LIVERS Solvey Firth Clyde Miver Tav River Forth River

SCOTLAND TARD, the center of a great web that covers London—the original head-quarters of the detective department of the metropolitan police. Until 1890, the daily drama of crime detection was enacted in a building which, from the tenth to the twelfth century, had lodged visiting Scottish kings and ambassadors. Of the vanished pomp and

giory, there remained only the name Sociland Tardi

In 1500 the metropolitan police, including the detective department, moved into an imposing group of buildings on the Thames Embardiment. The new headquarters was christened New Scotland Tarti by Police Commissioner James Monro, who, while head of the detective department, had grown to love old Scotland Tarti.

But the popular conception of Scotland Tard is not of a building, but of the most remarkable organization of detectives in the world. 1970 frame, no film story yet volues, has been so entirabling as our defly repertory on the filmly lighted stage set in a corner of the gratite building in Westminster, wrote one of the commissioners in charge of the terministences, which are as lastinating as any ficultious tale ever written lastinating as any ficultious tale ever written

the of the commissioners in charge of the Repartment in his reministences, which are as assumating as any fictitious take ever written. SOUTH, Thyroary Camerana (2862-16), a Camerana poet and distortical written, born at Ottawa. Onto There he attended the public schools, and later went to Stanstead Wesleyan Codege. In 1879 he entered the Dominion civil service as a deck in the Department of Indian Affairs, and was steadily promoted until, in 1913, he became deputy superintendent-general of the department. The redired in 1982.

Literary Career. Soon's first volume of verses, The Magic France, appeared in 180s, and was followed by Labour and the Angal, New World Levius and Edica, Lundy's Lone and Other France, Secury and Ly's, and France Clother. In the Village of Vigor and The Woolding of Espic are fiction. Soon was joint editor of The Mohers of Canada, a series of historical biographies, and himself wrote the life of John Graves Simonein that series. See Canadam Literatura (English Canadas Poerry).

SCOTT, Huge Lenon (1853-1934), chief of staff of the United States army, 1914-1917. In September, 1917, General Scott had reached the age limit for retirement from the army, but December of that year saw the beginning of two years of extremely active service as commander of the Seventy-eighth Division, which served with British and French troops. General Scott was present at the famous battle for Passchendaele Ridge in 1917; inspected the line from Verdun to Tyres; and in 1918 was awarded the Distinguished Service Medal.

Hugh Lenox Scott, the son of a great-granddaughter of Benjamin Franklin, was born in Danville, Kv. In 1876 he was graduated from West Point as a second heutenant of cavalry. Twenty-seven years were spent on duty in the West in expeditions against the Indians, in investigation of ghost dances, in routine duty, and in enlisting and training the Indians to be good soldiers. A troop of the Kiowa, Comanche, and Apache Indians organized by Scott was the last Indian troop to be mustered out of the army, in 1897. The

valuable information about the Indians gained on the Western plains led to Scott's appointment to the Bureau of Ethnology at the Smithsonian Institution, where he spent about a

year preparing reports on the Indian sign

language.

From the close of the Spanish-American War until 1903, Scott acted as adjutant general of Cuba, and for the next three years, was governor of the Sulu Archipelago. He abolished slavery and the slave trade in the islands. He returned to the United States with the rank of colonel, in September, 1006, and assumed the duties of superintend-



Photo: Harris & Ewing HUGH L. SCOTT

ent and commandant at West Point. During his four years at West Point, he was assigned the diplomatic task of settling grievances of the Indians in New Mexico and Arizona for the Department of the Interior. He managed the situation so well that, in 1911 and 1912, he was engaged in settling troubles with the Hopi and Apache Indians; in 1913, with the Navajos; and in 1915, with the Piutes. Between 1912 and 1914, he commanded cavalry troops at Fort Sam Houston and troops patrolling the Mexican border. In April, 1914, he became assistant chief of staff, and in November was appointed chief of staff. Through his diplomatic efforts, an impending conflict with Mexico in 1915 was averted, and in the same year, he recovered American property confiscated by Villa. As a member of the American Commission headed by Elihu Root, General Scott visited Russia in 1917. He was Chairman of the New Jersey Highway Commission between 1923 and 1933.

SCOTT, ROBERT FALCON (1868-1912), a noted English explorer, who lost his life on the return journey from the South Pole, which he had set out to discover, but which had been reached a month earlier by Roald Amundsen. He was born at Outlands, Devonport, and was educated at Stubbington House, Fareham. In 1882 he entered the British navy, and had attained the rank of naval assistant to the second sea lord of the admiralty by 1909, when

he resigned.

Meanwhile, Scott had become absorbed in plans for Antarctic discovery, and between 1901 and 1904 had made one such expedition. Late in 1910, he sailed in the *Terra Nova* from New Zealand, with the hope of arriving at the Pole, and without incident reached Cape Evans on Ross Island, where he had determined to set up headquarters. During the summer

of 1911, he established supply stations along his proposed route toward the Pole, and in October started with sledges over the ice. For part of the journey, snowstorms and bad sledging made advance slow and difficult, but the men kept on, and as they neared the goal, conditions grew more favorable. On January 18, 1912, they reached the Pole, only to find

that Amundsen had been before them in the discovery. Setting out on the return journey, the whole party of five died from privation and ex-

posure.

The bodies, together with records and diaries the men had kept, were found in the tent which had been erected as their last camping place, and Scott's journal, written up to the day of his death, gave what he considered



Photo: Brown Bros

ROBERT F. SCOTT

the causes of the disaster, and closed with an appeal to the public to provide for his family and the families of his companions. It was an appealing account of a tragedy which shocked the whole world. Near the place where he died, a memorial has been erected.

Related Subjects. The reader is referred in these volumes to the following articles:

Amundsen, Roald Polar Exploration (Antarctic Exploration) Ross, James Clark Shackleton, Sir Ernest Henry

SCOTT, THOMAS. See RED RIVER REBEL-LION.

SCOTT, SIR WALTER (1771-1832). This great Scottish novelist and poet was the son of an Edinburgh lawyer, a man with little adventurous spirit; but among the ancestors of the family, on both sides, were border chieftains, tales of whose bold raids and marauding expeditions still lived in the countryside. Young Walter Scott never tired of hearing these accounts-indeed, every one with whom he came in contact was called upon to tell him stories. It was fortunate that he could find enjoyment in this way, for an illness, contracted when he was less than two years old, left him lame and delicate and unable to play like other boys. He was sent to his grandfather's farm to regain his strength, and spent days listening to the stories his aunt read to him, or lying in the fields, watched over by his grandfather's old shepherd. For a boy with an intense interest in all he saw about him, it was very hard to lie still and look at things from a distance, and gradually he began to drag himself about.

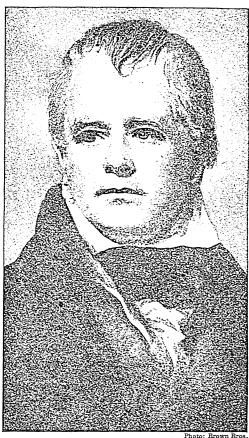
Strength came back to him, and by the time he was eight years old, except for his lameness, he was as robust as any of his fellows. Then he was sent to school, but he was behind other boys of his age, and consequently lost interest. His record, therefore, was not always satisfactory, though his teachers admitted that he was unusually quick in comprehension. Like little Charles Dickens, however, he was in great demand among his schoolmates as a story-teller. He took a large part, too, in the sports of the school, and the little sketch which he wrote, years later, of his boyhood days tells of exciting mock battles which the schoolboys had with the boys of the town. Through it all, he kept his fondness for romantic tales and poems, and before he was ten years old, began making a collection of books on such subjects. The finding of Percy's Reliques of Ancient English Poetry was an epoch in his life, and exercised a distinct influence on his literary activity.

The Practice of Law. Two years at the University of Edinburgh added nothing to his reputation as a student, though, when his interest was once aroused, no work was too hard for him. Thus he mastered French, Italian, and German, that he might read the romantic literature in those tongues. His father had determined that the son was to follow the legal profession, and though he had no great liking for it, he applied himself with diligence to the work in his father's office, and later entered law classes at the University of Edinburgh. In 1792 he was called to the bar. During his days of apprenticeship, he took trips about the country, finding especial delight in old battlefields, ruins, and other places with historical associations. The fact that Scott thus steeped himself in the literature of romance and acquainted himself thoroughly with the historic backgrounds of happenings in his own country accounts in part for the wonderful speed with which he later produced his great

Scott's law practice, while never large, was promising enough to warrant him in marrying Charlotte Charpentier, in 1797, and the young couple divided their time between Edinburgh and the suburb of Lasswade. An appointment as sheriff of Selkirkshire, in 1799, and as a clerk of the Court of Session, some years later, assured him an income, so that he was able to give up the law and devote himself to literature.

Beginning of Literary Career. The first works which appeared under his name were translations, in 1706, from the German of Bürger's Lenore and The Wild Huntsman, followed three years later by an English version of Goethe's Götz von Berlichingen. Meanwhile, he had tried his hand at poetry, and produced the fine ballads of Glenfinlas, the Eve of Saint John,

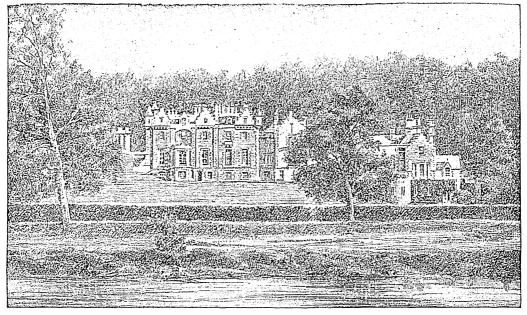
and Grey Brother. For years he had been collecting Scottish border poetry, and the results of his work were published in 1802 and 1803 as Minstrelsy of the Scottish Border, which won him wide and favorable notice. In 1805



SIR WALTER SCOTT

By their vigor, their freshness, their rapid action, and their breezy, out-of-door atmosphere, Scott's novels attracted thousands of readers who else had known nothing of the delights of literature. therefore, the greatest known factor in establishing and in popularizing that romantic element in prose and poetry which has been for a hundred years the chief characteristic of our literature.—Long.

appeared his first original work of note—the long poem called The Lay of the Last Minstrel. Its popularity was immediate and great, and Scott might almost have said, like Byron, that he "woke one morning and found himself famous." Marmion followed, and was even more enthusiastically received; the swinging lines, as one biographer has said, "took possession of the public like a kind of madness;—people could not help spouting them in solitary places and muttering them as they walked about the streets." Scott himself was astonished at his success, which was repeated in 1810 on the publication of The Lady of the Lake, which drew



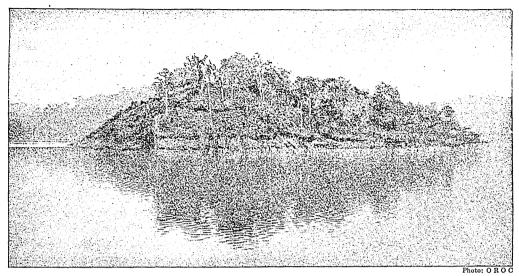
ABBOTSFORD, "THE ROMANCE IN STONE"

crowds of tourists to the scenes it described, and raised the post-horse duty in Scotland.

In 1804 Scott removed from Lasswade to the banks of the Tweed, where, seven years later, he bought a farm of one hundred acres, with an unpretentious cottage. From year to year, as his income warranted, he bought more land, and little by little built up the magnificent castle of Abbotsford, "the romance in stone" which was the pride of the countryside. Not until 1824 was it finished. Scott showed the keenest interest in every phase of its progress, and delighted particularly in the library, with its carved oak ceiling and thousands upon thousands of books, and the armory, with its notable collection of weapons.

Abandoned Poetic Form. Scott had felt that poetry was not for him the only possible mode of expression, and as early as 1805, started Waverley, which, however, he laid aside. As he began to realize that the poems which followed The Lady of the Lake were diminishing rather than increasing his fame, he determined to return to the prose romance, strengthened in his purpose by the fact that Byron was surpassing him in his own field in poetry. In 1814 Waverley appeared anonymously, and the earlier success of the poetry was duplicated. The "Great Unknown" was discussed on all sides, and although before long the secret became an open one, it was not until 1827 that Scott formally acknowledged the authorship. In incredibly rapid succession appeared the volumes in the long series of Waverley Novels, two often appearing in one year. Indeed, even to those who were practically certain that they were from Scott's pen, it seemed impossible that he could produce them, at the same time attending to his official duties, playing the gracious host to the constant stream of visitors at Abbotsford, and writing the things which were at this same time appearing under his own name. Among these novels, the most noteworthy, perhaps, were Guy Mannering, The Heart of Midlothian, The Bride of Lammermoor, Ivanhoe, Kenilworth, Quentin Durward, and The Talisman, though to lovers of Scott, not one of all the volumes is without its peculiar interest and charm.

Struggle Against Financial Difficulties. In 1820 Scott's fortune seemed certain. sales of his books assured him perhaps \$50,000 a year, he was sought after by the notable and the wealthy, and he had just been created a baronet. His good fortune, however, was built on an insecure foundation. Years before, he had become a silent partner in the printing firm of James Ballantyne & Company, and more than once he had been called upon to rescue it from misfortune. In 1826 the failure of the great publishing business of Constable & Company brought Scott's firm into bankruptcy, the amount of indebtedness being about \$600,000. The Ballantynes withdrew, and the creditors themselves offered compromise; but Scott's sense of honor caused him to assume the whole vast sum as a personal debt. "Time and I," he declared, "against any two"; and again, "If I live and retain my health, no man shall lose a penny by me." The struggle that followed was heroic, and Scott's facility in composition stood him in good stead. Woodstock, The



ELLEN'S ISLE, OF SCOTT'S LADY OF THE LAKE

had in their own day, they are still read widely, and with pleasure, for the stories they tell, the pictures they present, and their constant movement. His novels were read at one time perhaps

more than any others, and the modern tendency toward historical fiction may be traced largely to their influence.

B.M.W.

SCOTT, WALTER DILL (1869-), president of Northwestern University, Evanston, Ill., from 1920 to 1939. Twenty-five years after he had received his A.B. at Northwestern University, Walter Dill Scott was installed as president. He was born in Cooksville, Ill., and was educated in the public schools. After his graduation from Northwestern, he studied at McCormick Theological Seminary in Chicago, and received a doctor's degree from the University of Leipzig. He returned to Northwestern in 1901 as associate professor of psychology and education and became professor in 1908. For a year (1916-1917), he served as director of the Bureau of Salesmanship Research of Carnegie Institute of Technology, Pittsburgh. His work in personnel classification, during the World War, brought him the Distinguished Service Medal. He was also president of a firm of consultants and engineers in industrial personnel for two years (1919-1921). See Northwestern University.

His Writings. These include Die Psychologie der Triebe, Theory of Advertising, Psychology of Public Speaking, Psychology of Advertising, Influencing Men in Business, Increasing Human Efficiency, Psychology of Advertising in Theory and Practice, Science and Common Sense with Working Men, Personnel Management, and Man and His Universe.

SCOTT, WINFIELD (1786-1866), an American soldier who distinguished himself in active service in the War of 1812 and the Mexican War, and who was kept from fighting in the

Fair Maid of Perth, Anne of Geierstein, a Life of Napoleon in nine volumes, four volumes of historical sketches known as Tales of a Grandfather, were but a part of what came from his pen between 1826 and 1831. Friends and the public stood by him, and the new edition of his novels sold rapidly. Within two years from the date of the crash, he had paid to his creditors nearly \$200,000, and it seemed as if he might in time free himself from the debt. His health broke under the strain, however, and at length he consented to try a change of air. The government placed a vessel at his disposal, and he cruised about the Mediterranean, stopping at Naples and at Malta. It was in vain, and he begged to be taken back to Abbotsford before he died. His mind had partially failed after paralytic strokes, and he came to believe firmly that the last of his debts had been paid. Happy in this belief, he died, on September 21, 1832. He was buried at Dryburgh Abbey, where his wife had been laid six years before. In 1847 all of his voluntarily assumed obligations were paid off by the sale of copyrights, and his name was left as free as he himself would have had it. See monument, page 2108.

Estimate of the Novelist. As, in Scott's boyhood, his playmates gathered round him and made him the center in their games, so, in his manhood, he drew to him all who knew him. His sunny, genial nature, his unfailing kindliness, the simplicity with which he bore his honors, made him one of the most attractive figures in all literary history. The crowds which visited him at Abbotsford often intruded on his time, but never did they find him other than courteous. And the influence which comes from his works is as strong and as wholesome as that from his life. While his poems have not kept the immense popularity which they

War of Secession only by his advanced age. Scott was born near Petersburg, Va., and educated at William and Mary College, where he studied law. He was admitted to the bar in 1807, but abandoned law, and entered the

army in early man-hood. Upon the outbreak of the War of 1812, he was commissioned lieutenant colonel and went to the Canadian border. At the Battle of Queenston Heights, he was taken prisoner, but was later exchanged, and in 1814 fought at Chippewa and at Lundy's Lane. At the close of the war, Congress conferred upon him the rank of major general. Scott's next service was the preparation of the first complete manual of military



WINFIELD SCOTT

He fought in two wars, was commander of the United States army, and was prevented only by age from serving in a third great war.

tactics ever compiled for the United States army. He introduced the French system of tactics. During the next few years, he was active in Indian affairs, and in 1841 succeeded

to the command of the army.

Then came the war with Mexico. In the spring of 1847, Scott took chief command in the enemy's territory, and when the war closed, he had to his credit the victories of Vera Cruz, Cerro Gordo, where he defeated Santa Anna, Contreras, Churubusco, Molino del Rey, and Chapultepec, and the capture of Mexico City (see Mexican War). Though "Old Fuss and

Feathers," as he was affectionately called by his men, returned from the war a national hero, he was defeated for President by Franklin Pierce, in the campaign of 1852, in which he headed the Whig ticket. Congress revived the brevet rank of lieutenant general for him in 1855. In 1861 he retired, and died at West Point five years later.

SCOTTI, skot' e, ANTONIO (1866-1936), an Italian baritone whose excellent voice



ANTONIO SCOTTI

and high talents as an actor brought him into the front rank of operatic stars. He was born in Naples. At the age of twenty-three, he made his first appearance in grand opera at Malta, playing the rôle of Amonasro in Aïda. His début gave promise of future greatness, which later tours in Europe and America abundantly fulfilled. In 1899 he sang for the first time in the Metropolitan Opera House, New York, and thereafter appeared regularly with the Metropolitan organization. His repertory included Don Giovanni, Faust, Otello, La Tosca, and Il Pagliacci. His interpretation of the name rôle in Mozart's Don Giovanni was his finest achievement. In 1921 he organized a company of Metropolitan stars which made tours after the regular seasons were closed. In 1933 Scotti retired from grand opera.

SCOTTISH CHIEFS, historical novel by

Jane Porter (which see).

SCOTTISH RITE. See MASONRY. SCOTTISH TERRIER. See TERRIER. SCOTTS BLUFF, a 4,622-foot-high butte in

SCOTTS BLUFF, a 4,622-toot-high butte in western Nebraska, which served as a beacon to emigrants on the Oregon Trail. See Monuments, National.

SCOTUS. See Duns Scotus, Joannes. "SCOURGE OF GOD." See Attila. SCOURING RUSH. See Horsetail. SCOUTCRAFT. See Boy Scouts.

SCRANTON, PA., the county seat of Lackawanna County, and the third largest city in the state, ranking next to Philadelphia and Pittsburgh. It is situated in the northeastern part of the state, eighteen miles northeast of Wilkes-Barre and 134 miles northwest of New York City. Scranton is the metropolis of the anthracite-coal region, and the mining and shipping of coal is the principal industry. The annual output of mines within fifteen miles of the city reaches approximately 20,000,000 tons. Population, 140,404 (1940).

General Description. Scranton is located on an undulating plateau of the Allegheny Mountains, and within a two hours' motor ride of the city there are 150 lakes of great natural beauty. The Roosevelt Highway, Lackawanna Trail, and Appalachian Scenic Highway enter Scranton, and short motor trips take one to the Delaware Water Gap, the Pocono Mountains, the Tunkhannock concrete viaduct, and the Susquehanna River

state forest.

Scranton occupies an area of about twenty square miles, and has more than 110 miles of paved streets and boulevards. Lackawanna, Wyoming, Penn, Washington, and Adams avenues are the principal business streets of the city. Near by are several beautiful suburbs, including Green Ridge, Nay Aug, and Elmhurst.

Transportation. Scranton is served by five railroads—the Delaware, Lackawanna & Western, the Delaware & Hudson, the Erie, the New York, Ontario & Western, and the Central of New Jersey The Lackawanna & Wyoming Valley electric railway connects Scranton and Wilkes-Barre. Scranton also has air, motorbus and truck transportation.

Industries. Scranton is an important retail, wholesale, and jobbing center, and aside from its vast coal industry, which takes first place, the Scranton district ranks second in the United States in silk manufacturing, having become the center of the rapidly growing silk-making district in northeastern Pennsylvania. The city also has one of the largest lace mills in the world and a tremendous textile industry. Other manufactured products include locomotives, lace curtains, textbooks, silk, plastics, clothing, printing and photoengraving equipment, textile and mine machinery, chemicals, cigars, phonograph records, electric pumps and condensers, steel equipment, stokers, printed specialties, incandescent lamps, and many other articles.

Education. The International Correspondence Schools, with which the Woman's Institute is affiliated, are among the largest schools of this type. Extension schools of Pennsylvania State College and of the University of Pennsylvania, Marywood College for girls, and Saint Thomas College for boys are some of the schools located in Scranton.

Institutions. Among the institutions of the city are the Everhart Museum of Natural History, the Pennsylvania Oral School for the Deaf, Home for the Friendless, Florence Crittenton Mission, House of the Good Shepherd, and Saint Joseph's Shelter. The notable buildings include the Chamber of Commerce, Albright Memorial Library, Platt-Woolworth House connected with the Y. W. C. A., and the Masonic Temple and Scottish Rite Cathedral.

History. First settled in 1786, the city had its industrial beginning in 1840 when the Scranton brothers established the Lackawanna Iron Works. With the discovery of rich anthracite deposits, coal became the leading industry. In 1886 the first electric street railway began operation, and in 1903 the first third-rail system was successfully used in Scranton, after which

New York City equipped its elevated railway with the system. J.H.B.

S C R E E N GRID. See RA-DIO COMMUNICA-TION (Glossary of Radio Terms).

SCREW. This familiar device is called, in the language of physics, a simple machine. The spiral projection on the surface of the cylinder is known as the thread, and the cylinder is called the body.

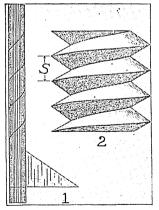


FIG. 1
(1) The screw is a spiral inclined plane. (2) The pitch of the screw is shown at s.

Cut from paper a right-angled triangle with an altitude at least three times the length of the

base. Draw a heavy line along the edge of the oblique side of the triangle (its hypotenuse), and then roll the paper around a pencil, beginning at the wide end (see 1, in Fig. 1). The dark line around the pencil corresponds to the thread of the screw. In 2 of Fig. 1 is shown a section of the projecting spiral. The vertical distance (s) between two consecutive threads is known as the pitch. The screw works in a nut having a spiral groove into which the thread

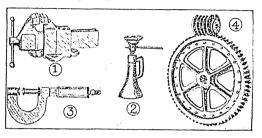


FIG. 2
(1) Vise; (2) jackscrew; (3) micrometer screw; (4) worm wheel.

of the cylinder fits, and the effort is usually applied by a lever or a wheel which moves through the circumference of a circle. The effort, it should be understood, is applied at the end of the lever.

The mechanical advantage of the screw is stated thus:

With the screw, a given effort will support a load as many times as great as itself as the circumference described by the effort is times as great as the pitch of the screw.

A complete revolution of the screw raises the load a distance equal to the pitch. A screw having five threads to the inch has a pitch of one-fifth inch. See Machine (Six Simple Machines).

Application. To ascertain the load that can be raised by a screw with a given effort, multiply the effort by the circumference of the circle which it describes, and divide this product by the fraction representing the pitch. The formula for this process is as follows:

L×p=E× $2\pi r$, or L= $\frac{\text{E}\times 2\pi r}{p}$. Here, L=load, p=pitch, E=effort, and $2\pi r$ =circumference of the circle, π (pi) representing 3.1416 and r representing radius.

What load can be raised by an effort of 20 pounds, acting upon a lever 5 feet long and attached to a screw having a pitch of $\frac{1}{2}$ 5 of an inch? Since the lever is 5×12 inches in length,

L× $\frac{1}{2}$ 5=20×2×3.1416×5×12, or, L=7539.84×5 or 37,699.2.

Note that dividing the product by the fraction representing the pitch is equivalent to multiplying the product by the denominator of that fraction. Theoretically, the screw will raise a load of 37,699.2 pounds, but practically, the result is somewhat less because of the effort used in overcoming friction.

6454

Uses. The screw is applied to so many uses that to name them all would be impracticable. We are all familiar with the wood screw used by carpenters, and with the screw on the end of bolts. Nearly all vises (1, in Fig. 2) are opened and closed by a screw. The jackscrew (2) is used for raising buildings. The mi-

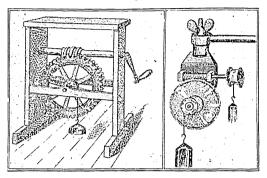


FIG. 3 Two forms of endless screws.

crometer (3) measures minute distances by means of a screw having a very fine thread (see MICROMETER). The head of the micrometer screw is usually divided into hundredths, so that a hundredth of the interval can be measured.

Endless Screw. An endless screw consists of a thread on an axle that meshes into the teeth of a wheel. Such a device is sometimes called a worm wheel (4). Fig. 3 shows how the worm wheel may be used for raising heavy loads.

SCREW, ARCHIMEDEAN. See ARCHIMEDEAN SCREW.

SCRIBE, skreeb, Augustin Eugène (1791-1861), a French dramatist, born in Paris. He was educated for the law, but his tastes were literary, and he soon began to write for the stage. After early successes, he undertook work in collaboration with other writers, with the result that over 400 dramatic productionscomedies, tragedies, vaudeville sketches, and opera librettos-were ascribed to his pen. He chose his characters from the middle classes, and selected themes that were highly interesting and popular. In addition, he was master of the technique of the stage, and later dramatists learned much from him. In 1836 he was made a member of the French Academy.

His Writings. Scribe is best known for his librettos of Fra Diavolo and Les Huguenots, two operas of lasting fame. Other productions from his pen are now little known; among them are Bertrand et Raton, L'Ours et le Pacha, and Adrienne Lecouvreur. R.T.H.

Originally, the scribes were SCRIBES. military officers in charge of recruiting; later, they became copyists of the law, and, finally, they developed as a class of learned Hebrews who were required to expound and interpret

the law and keep the official documents of the kingdom. The earlier scribes were priests (see Ezra), but, in later times, this was not the rule. In Christ's day, they were designated as doctors of the law. They were highly revered by the people. Some had special classrooms in the Temple, where they taught those who were to become rabbis. Those scribes not sufficiently learned remained copyists. Most of the scribes belonged to the party of Pharisees, and they constituted the scholarly leaders of that body. Paul's teacher, Gamaliel, was a scribe. In Matthew XXIII, 14 to 25, Christ is recorded as rebuking the scribes and Pharisees for their hypocrisy. See Pharisees.

SCRIMMAGE. See FOOTBALL.

SCRIPPS, EDWARD WYLLIS (1854-1926), one of the most influential of American journalists, born at Rushville, Ill. He founded chain journalism and the United Press Association, controlled a large number of dailies and newspaper services, and endowed a national science news service. He boasted that no influence could swerve him and his associates from the paths they blazed for their papers. He desired that, in the highest degree, the best interests of each community should be served. In 1917 his health failed, and he subsequently transferred the control of his newspaper interests

to his son, Robert P. Scripps (1895-1938).

During the last years of Scripps' life, he lived on his sumptuously appointed yacht. His address was "On board S. S. Ohio, abroad

on the waters of the world."

His Newspapers. The papers controlled by the elder Scripps at the time of his death included the Akron Press, Baltimore Post, Birmingham Post. Cincinnati Post, Cleveland Press, Columbus (O.).
Citizen, Denver Express, El Paso Post, Evansville
Press, Fort Worth Press, Houston Press, Knoxville News, Indianapolis Times, Memphis Press, New Mexico State Tribune, Oklahoma News, Pittsburgh Press, San Diego Sun, San Francisco Daily News, Terre Haute Post, Toledo News Bee, Washington Daily News, Youngstown Telegram, Kentucky Post (Covington).

SCRIPPS INSTITUTION OF OCEANOG-RAPHY, the only one of its kind in America, is situated on the beach at La Jolla, Calif., where marine life is abundant. It is under supervision of the University of California.

SCROFULA, skrof' u lah, a form of tuberculosis which is characterized by swelling of the lymph glands and by poor nutrition of the tissues. Usually, the glands in the neck are affected, but the infection may occur in any lymphatic gland, and in many cases, abscesses form in the swollen parts. The best course of treatment is that which is based on a recognition of the value of sunlight, fresh air, nutritious food, and warm and suitable clothing. Physicians generally prescribe cod-liver oil and similar tonics, and the glands are sometimes painted with iodine to reduce swelling; a local operation may be necessary in case of abscess.

In England scrofula was formerly called the king's evil, because it was believed that a victim could be healed if his sovereign touched him. There is a well-founded story that Samuel Johnson, at the age of three, was taken to London to be touched by Queen Anne. The practice is supposed to have originated with Edward the Confessor. See Tuberculosis. W.A.E.

the Confessor. See Tuberculosis. W.A.E. SCRUPLE, skru' p'l, a measure of weight used only by apothecaries. There are three scruples in a dram, twenty-four in an ounce, and 288 in a pound. The scruple is equivalent to twenty grains (see table, under Denominate Numbers). The scruple was the lowest denomination of weight among the Romans, being the twenty-fourth part of an ounce (uncia), or the 288th part of a pound (libra).

Derivation. The word is from the Latin scrupus, meaning a sharp stone, and, figuratively, uneasiness

of the mind. The word is also used in English to mean reluctance or hesitation.

SCULLS, short oars used for propelling a boat, also called a scull. The boat carries one person, or sometimes two. See ROWING.

SCULPIN, any of a group of oddly shaped fish consisting of about 250 species, found chiefly around the rocky coasts in regions of the north. While they are mostly marine, some of them inhabit fresh water. Their flesh is too coarse to be of much food value, but is eaten by peoples in the Arctic regions. The typical sculpin has a club-shaped body, spiny fins, large, grotesque mouth, and skin covered with warty projections. These fish prey upon small aquatic animals, and are voracious eaters, often stealing the bait of anglers. They are themselves preyed upon by larger fish. They constitute the family Cottidae of the Loricata group. Locally, they are known as miller's thumb and sea raven.





The STORY of SCULPTURE

culpture, skulp'-ture. Among the arts of design, three stand out pre-eminently — architecture, sculpture, and painting. In origin, sculpture and painting long preceded architecture. Even in the early age of stone, the so-called Paleolithic Period,

men painted figures of animals in the caves in which they lived, and, more rarely, modeled similar figures in clay. These are generally thought to have been produced with the idea that in some magic way the figures would aid in hunting the animals portrayed. The bone and horn handles of weapons were also decorated with figures of men and animals in relief. The best of these paintings and carvings have been found in caves in southern France and northern Spain, and are distinguished by remarkably lifelike drawing. From the succeeding later age of stone, the Neolithic Period, which seems to have been introduced by tribes of different origin, no such advanced works have been preserved; indeed, the sculpture is of the crudest sort. But with the age of metal came gradual improvement, and the art was never after completely lost.

Processes. While we are accustomed to think of the sculptor as one who hews a statue out of a block of marble, the actual work of the artist is quite different. Before the work in stone can be done, a clay model is usually made, and this model

is cast in plaster. The whole process is very interesting. The artist usually models a small figure of the statue to serve as a pattern. Then he reproduces this on a large scale, molding the clay on an iron framework of the required size. When the clay model is completed, plaster of Paris is poured over the figure to a depth of two or three inches, and allowed to "set." Then the artist removes the clay, leaving what is called the "waste mold." Plaster of Paris is then poured into the mold, and when the plaster has hardened, the waste mold is carefully chipped away. Thus a cast of the figure is obtained. In many instances, different portions of the statue are cast separately, a practice known as piece molding.

The reproduction of the cast in marble is the next step. Usually, the block of marble and the model are placed near each other upon

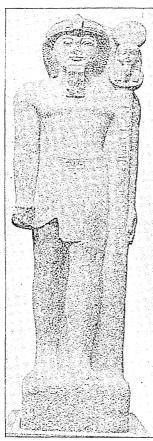


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pedestals. By means of an accurate pointing machine and other devices, the important points of depression in the model are marked on the block, and holes are drilled in the stone. Finally, a skilled stonecutter hews the marble away, according to the position of the holes,

and the statue is ready for finishing touches. The finishing is done by the sculptor, but this is only a small feature of the work. In fact, many modern sculptors know little about actual carving in marble. It is known, however, that Michelangelo, whose supremacy in sculpture is unquestioned, sometimes hewed his creations from the marble block without the aid of a cast model, and this was also the custom of the earliest sculptors of antiquity.

Sculpture in bronze involves other processes. The colossal Statue of Liberty in New York Harbor is an example of the repoussé process, in which thin sheets of bronze are



EGYPTIAN SCULPTURE
Supposedly a statue of Rameses II.
[In the Cairo Museum.]

beaten into the desired shapes and fastened to a framework, or core. Statues are often cast in bronze by the following process: A core of fireproof material is made, having the shape of the intended figure, but made on a slightly smaller scale. A coating of wax is applied to this, and in it the details are worked out. Then a coating of fireproof material is applied, to serve as a mold, the core and outer coating being fastened together with bronze pins. Next, the figure is heated until the outer coating hardens, and the wax melts and runs out of holes at the bottom. Molten bronze is then poured in, filling the space formerly occupied by the wax, and when the metal has hardened, the mold and core are removed, leaving a hollow metal statue, perfect in every detail. Nearly all ancient bronze statuary was produced in this way.

The figures so far considered are examples of sculpture *in the round*. Figures are also carved upon a solid surface, so as to project from it, and are said to be *in relief* (see Relief).

History of Sculpture

The art of sculpture can be traced through all civilizations—in the bronze gods and demons of China, in the rock-hewn temples of India, in ancient Mexico, in Babylon, and in the countries mentioned in this article.

Egypt. It was in the valley of the Nile that sculpture first developed as a fine art. It is an interesting fact that, in all other nations, sculpture was in the beginning conventional, and later became free and natural, while in Egypt the reverse is true. The earliest forms of this art, reliefs in the tombs of the dead, are realistic portrayals of the daily life of the deceased and his family, or pictures of life after death. Statues in the round were also produced in the early period, and these have a freedom and a naturalness that make them comparable to Greek works of a later date.

As Egyptian sculpture developed, it came under the influence of the priests, and the colossal figures of gods and kings, typical of the art in the height of its development, represent certain fixed conventions and limitations. The figures seem to belong to a "world of the tomb, one which never was alive." Yet they have a grandeur and dignity that make them impressive. Before the rock-cut temple of Abu-Simbel, there are four statues of Rameses II sixty-five feet in height (see illustration, page 5992). The Egyptian artists worked in marble, granite, basalt, limestone, bronze, wood, porcelain, ivory, and many other substances, and their skill in the carving and finishing of hard materials indicates that they used very ingenious tools. The most remarkable monument of ancient Egyptian sculpture is the Sphinx at Gizeh, a huge figure with the head of a man and the body of a lion. Nearly all statues, except those carved from colored material, were painted. For illustrations of Egyptian sculpture, see the articles Egypt and

Assyria. See Assyria (Art), and illustrations; Winged Bull.

Greece. While the earliest examples of sculpture in Greece indicate the influence of Oriental ideals, in its development this branch of Greek art bears out forcibly the saying that "the Greeks did not originate art, but they invented beauty." The Greek sculptors, even in the seventh century B.C., broke away from the conventional forms of Egypt, finding fullest expression in the human form. An independent development followed, in which the art reached the greatest heights it has ever attained. The first period of Greek sculpture, sometimes

called the Archaic, lasted until near the end of the Persian Wars, or about 480 B.C. From about 700 B.C. to 500 B.C., there was a formative era, in which the artists were gaining control of their materials, and definite schools were being established. The statues of this era are



WINGED, MAN-HEADED LION
Assyrian sculpture, from a doorway in the palace of
Assurbanipal.
[Now in the British Museum.]

stiff and conventional, and many of them are draped. Following this period, there was a period of development, in which the sculptor worked toward a freer, more natural expression of his ideal.

Then came the Persian Wars, the victorious outcome of which was a wonderful stimulus to the creative forces of the Greeks, not only in sculpture but in literature and all the other arts. The period of glory (480 B.C.-323 B.C.) is known as the *Great Period*. Greek sculpture in Athens came into full splendor under the inspiration of the great statesman Pericles (which see), with whose name is always linked that of the supreme genius of ancient sculpture —Phidias. There was, however, a transitional period in which sculptors all over the Greek world were giving expression to that love for physical beauty which was stimulated by contemplation of the noble athletes competing in the national games. To this period belongs Myron, sculptor of the celebrated bronze Discobolus, or Discus Thrower (see illustration, accompanying Discus, Throwing The).

Under the rule of Pericles, Athens became a city of noble temples adorned with statues of

the gods. Phidias not only designed the famous frieze for the Parthenon (see illustration at the head of this article), but he executed a colossal statue of Athene for that temple, and one of Zeus for the temple at Olympia. The latter, a work in gold and ivory, thirty-five feet high, was one of the seven wonders of the ancient world. Phidias had several contemporaries of outstanding importance, including Polyclitus of Argos, whose masterpiece was a statue of Hera, and Paeonius, of Mende, sculptor of a famous Nike, or Victory, set up at Olympia.

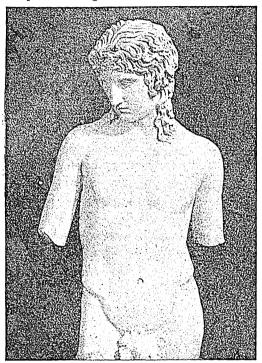
The sculptors of the age of Phidias idealized their subjects, giving expression in their work to a lofty religious aspiration. In the century following, which produced the so-called Later Attic School, the artists were more interested in individual traits of character, and sculpture became less heroic and more human. Portrait busts of living men were produced, and the statues of the gods revealed these divinities in



FEMALE HEAD Archaic sculpture, from the Temple of Aphaea, Aegina.

their individual moods. That is, there was a decided tendency toward realism and a drift from idealization. The two greatest figures of this school were Scopas and Praxiteles. Scopas was one of the sculptors who assisted in the adornment of the Mausoleum at Halicarnassus, one of the seven wonders of the world. See illustration under Tomb.

The single possible original known to be the work of Praxiteles is *Hermes With the Young Dionysus* discovered at Olympia in 1877, which is preserved in the museum at Olympia. Praxiteles, who is said to have "rendered into stone the moods of the soul," was also the creator of a matchless *Aphrodite*, set up in the temple to the goddess at Cnidus. The so-



CLASSIC GREEK SCULPTURE
A copy of a statue by Praxiteles.
[In the Vatican, Rome.]

called Venus de Medici, in the Uffizi Gallery at Florence, is believed to be a later modification of the Cnidian Aphrodite. The last Greek artist of whom we have any considerable knowledge, Lysippus of Sicyon, lived in the last half of the fourth century. His school represents a development of the Argive School of Polyclitus. Lysippus was celebrated for his works in bronze, especially his statues and portrait busts of Alexander the Great, and he was the leader of a school of art which adopted a new system of bodily proportions, using a small head, long legs, and a slender figure.

The death of Alexander the Great (323 B.C.) marks the end of the Great Period and the beginning of the Hellenistic, during which Greek culture was diffused over the lands in Asia and Egypt conquered by Alexander. This period ends with the conquest of Greece by Rome, in 146 B.C. Rhodes, the chief city of an island of the same name, in the Eastern Mediterranean, and Pergamus, a city in Western Asia Minor,

were centers of important schools of sculpture during the Hellenistic Period. The former produced the celebrated Colossus of Rhodes, a figure of the sun god made by Chares, a pupil of Lysippus; the Laocoön group (see illustration under Laocoön); and the Farnese Bull (see Farnese). To the Pergamene school belongs the bronze original of the famous Dying Gaul, a copy of which is preserved in the Capitoline Museum, Rome. The Hellenistic Period also produced two famous statues, both of which show the influence of the Attic School. These, the Nike (Winged Victory) of Samothrace and the Venus de Milo, are pictured in the panel at the head of this article.

Italy. The Roman Period. Toward the end of the republic, in the first century before Christ, an independent school of Roman sculpture began to take form, but for some time before this, the Romans had relied on Etruscan or Greek sculptors for the adornment of their temples and other buildings. During their conquest of the Hellenic world, they had borne



BUST OF A YOUNG MAN
(By Donatello; now in the Florence [Italy] National
Museum.)

away, as trophies of victory, numerous statues and bas-reliefs, and Greek sculptors in large numbers flocked to Rome after the conquest of their country. During the early empire, however, Roman artists produced some very commendable historic bas-reliefs and portrait statues, which were more than mere imitations of Greek models. The best portraiture of the Romans had a realism and vitality which the Greeks rarely attained, and this realistic tend-

ency was also manifest in their historic sculptures, such as the decorations on the Arch of Titus and those on the columns of Trajan and Marcus Aurelius. (See illustrations of Arch of Titus, page 7190; and Column of Trajan, page 7241.) Mythological statuary, however, was inspired chiefly by Greek ideals and traditions. In the third century A.D., Roman sculpture entered upon a decline, and when Christianity became the state religion, it de-

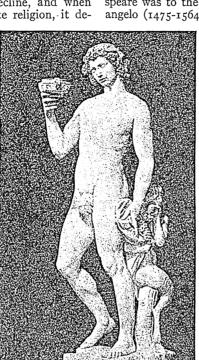
teriorated into a form of architectural decoration and lost all its former tendency

to realism.

Revival of Sculpture. During the thirteenth century, sculpture experienced a rebirth in Italy, and it was this revival that paved the way for the splendid achievements of the Renaissance. The leader in this movement was Niccola Pisano (about 1210-1278). His greatest masterpiece was a six-sided marble pulpit in the baptistery at Pisa, which he adorned with bas-reliefs representing scenes from the life of Christ. His son Giovanni (about 1245-1330) also won distinction in the revival of art. He was the founder of the school of Italian Gothic sculpture, which emphasized dramatic expression rather than classic beauty, the elder Pisano's ideal. This early period also produced Andrea Pisano (1270-1348), carver of the reliefs on Giotto's Campanile at Florence; and Andrea Or-

cagna (about 1300-1368), whose masterpiece was the tabernacle at Or San Michele, probably the finest example of Gothic art in Italy.

The Renaissance. One of the great masters of the Early Renaissance was Lorenzo Ghiberti (1378-1455), famed for his wonderful bronze doors in the baptistery at Florence. Michelangelo said of them that they were worthy to be the gates of Paradise. Donatello (1386-1466), Lorenzo's contemporary, was the great genius of this era, and his influence dominated Italian sculpture until the High Renaissance, which culminated in Michelangelo. A third great name of the Early Renaissance is that of Luca della Robbia (1399-1482), who worked in terra cotta, marble, and bronze. Sculpture through these masters and their followers advanced in naturalness, beauty of form, composition, and technique.



BACCHUS

[By Michelangelo; now in the Florence (Italy) National Museum.]

High Renaissance. It is characteristic of Italian sculpture of this period that there was no distinctly national school, but there were many schools, each centered in a special city. Siena, Padua, Venice, and Florence were all points of activity, but it was the Florentine school that produced the crowning figure of this golden age of Italian sculpture. What Shakespeare was to the Elizabethan drama, Michelangelo (1475-1564) was to the sculpture of his

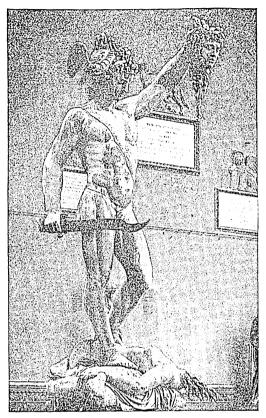
day. In him, all previous efforts to interpret passion and feeling were summed up and concluded; he was not only supreme as a sculptor, but as a painter and architect, and his influence on modern art cannot be overestimated. His colossal David at Florence. the Captives in the Louvre. the Moses in Rome (see illustration under Moses), the statues in the chapel of the Medici at Florence, and the Madonna in Bruges, are at once monuments to his individual genius and to the greatness of the period.

His immediate successors, with one exception, were too much given to the imitation and exaggeration of his manner to achieve anything more than mediocrity; this exception was Benvenuto Cellini (1500-1571), noted not only for his work in bronze, but for his skill as a goldsmith. Italian sculpture of the seventeenth century culminated in Lorenzo Ber-

nini (1598-1680), noted for his Apollo and Daphne. His death marks the last effort to keep Italian sculpture alive. He was the master of the baroque style, which aimed at elegance and movement, at a sacrifice of purity of ideas. Then the art declined until Canova (1757-1822) brought new life to it.

Modern Italian Sculpture. In the eighteenth century, Italy again became the center of the classical revival which spread thence throughout Europe. The result was the rise of a style based upon a return to Greek ideals. Canova was the first to give expression to this new conception; his Cupid and Psyche and Pauline Borghese are good examples of his art, which was characterized by imagination and grace, but somewhat lacking in the emotional element. His followers were close imitators. Only that which was strictly after the antique

was admitted into the Italian academies, and art degenerated into a cold conventionalism which was dominant until Lorenzo Bartolini (1777-1850) initiated the newer Florentine naturalistic school. The later nineteenth-cen-



PERSEUS

An example of Italian sculpture. [By Cellini; now in Florence (Italy), in the Loggia dei Lanzi.]

tury Italians, with the exception of Consani, Albani, and Fedi, drifted toward a naturalism which tended to become a debased realism.

France. The rise of an independent school of sculpture in France dates from the early sixteenth century, when the Italian Renaissance began to exert its influence upon all Europe. About this time, Tours was the foremost art center in France, and Michel Colombe (1431-1512) was the founder of its school of sculpture. Francis I, the Renaissance king of France, used his influence to build up a school of French sculpture; among the noted sculptors whom he appointed to execute great decorative works was Jean Goujon (1520?-1568?), whose art is best represented by his Fountain of the Innocents in Paris. One of the first acts of Louis XIV was to commence the building of the Palace of Versailles. Pierre Puget (1622-1694) executed numerous sculptures for this wonderful palace, as well as decorations for many

public buildings of Paris, while Francis Girardon (1628-1715) acted as chief inspector of sculpture at Versailles under Charles Lebrun.

The seventeenth century had favored great decorative sculptures, but in the eighteenth century there was a marked tendency toward single figures. Among the great artists that developed were Jean Antoine Houdon (1741-1828), a famous portrait sculptor; Joseph Bosio (1769-1845), whose bronze quadriga (two-wheeled chariot with four horses abreast) surmounts the triumphal arch of the Place du Carrousel in Paris; and François Rude (1784-1855), who absorbed the patriotic spirit of the Revolution and expressed it in The Marseillaise, the great bas-relief on the Arch of Triumph in Paris. The effects of the Romantic Movement left their impress upon the nineteenth-century French sculptors, among whom were Antoine Barye (1795-1875), sculptor of wild animals; and Jean Baptiste Carpeaux (1827-1875), creator of numerous portrait busts and sculptures on the Opera House in Paris. By far the greatest figure in modern French sculpture was Auguste Rodin, a zealous advocate of the idea that nature alone should be the artist's source of inspiration. He was one of the greatest realists who ever lived.

Germany. Germany slightly preceded France in point of time in the development of a national Renaissance style. Adam Krafft (1455-1507) of Nuremberg, a center of the so-called Franconian school, did much to raise the art of sculpture in stone to a high standard of excellence. His friend and countryman, Peter Vischer (1455-1529), turned his attention to casting in metal, and became famous as a bronze worker. Albrecht Dürer (1471-1528) was noted both as a sculptor and as a painter. Then came the devastating Thirty Years' War, and the history of sculpture was a blank

for many years.

The modern school of sculpture in Germany can be traced to the influence of Thorwaldsen, the Dane, a disciple of classical art. The first exponent of the classical revival in Germany was Johann Dannecker (1758-1841). He was followed by John G. Schadow (1764-1850) and Christian Rauch (1777-1857); the latter's masterpiece is his statue of Frederick the Great in Berlin. He was the founder of the Berlin school of sculpture, and his work shows a harmonious blending of naturalism and idealism. Others who worked along similar lines were Ernst Rietschel (1804-1861), Friedrich Drake (1805-1882), and August Kiss (1802-1865). Among sculptors of recent fame are Begas, Wolff, Hildebrand, and Schilling.

England. This country for many centuries gave little encouragement to those who labored with marble and bronze. Of the Renaissance sculpture, little is extant, and it was not until the reign of Charles I that any great progress

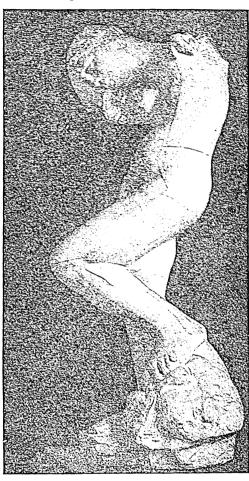
was made. was made. The first noted sculptor of this time was Nicholas Stone (1586-1647), whose The first noted sculptor of this fine tombs in Westminster Abbey show a tend-ency toward higher art. Thomas Banks (1735-1805) is regarded as the father of ideal English sculpture, though he was unappreciated in his day. John Flaxman (1755-1826) brought the classical spirit into English art and founded the school of the nineteenth century. His Saint Michael Overcoming Scian and Apollo show how nearly he approached the spirit of sculpture of Greece. For fifty years after Flaxman, the English sculptors were swayed by Canova's art. John Gibson (1790-1866), the most popular of Canova's English pupils, is best known through his Narcissus, Psyche Borne by Zephyrs, and Hylas Surprised. John H. Foley (1818-1874) and Patrick MacDowell (1799-1870) were the last great representatives of the classical school.

Alfred Stevens (1817-1875) was one of the first disciples of the modern school of naturalism. He executed the finest decorative sculpture in England, the Monument of the Duke of Wellington, in Saint Paul's Cathedral. But the leaders of this movement were two famous painters, Sir Frederick Leighton (1830-1806). whose Athlete Struggling with Python is now in the Tate Gallery, and George F. Watts (1817-1904), whose Clytie, in the same gallery, is a work of beauty and great power. Among the later sculptors of distinction are Thomas Brock (1847-1922), who represents a revolt against classicism; William Hamo Thornycroft (1850-1925), a sculptor of classical tendencies; Sir Alfred Gilbert (1854-1934), first English sculptor to preach and practice individualism; Edward Onslow Ford (1852-1901), famed for his delicately modeled portrait busts and statues; and J. M. Swan (1847-1910), a noted sculptor of wild animals.

Denmark. Bertel Thorwaldsen (1770-1844), next to Canova, exerted the most influence upon the art of his day, in bringing about the classical revival. He is the greatest figure in the history of Danish art.

United States. Early American sculptors of prominence were influenced chiefly by the art of Thorwaldsen and Canova, and their work is classical in spirit. Among them were Horatio Greenough (1805-1852), Hiram Powers (1805-1873), sculptor of the celebrated Greek Slave, William Wetmore Story (1819-1895), Randolph Rogers (1825-1892), and Harriet Hosmer (1830-1908). A more distinctly American art was developed by such artists as Thomas Ball (1819-1911), Henry Kirke Brown (1814-1886), J. Q. A. Ward (1830-1910), and John Rogers (1829-1904). The Centennial Exposition, held at Philadelphia in 1876, is a landmark in the history of American sculpture, for since that time, American artists have been wholly free from the influence of classic art.

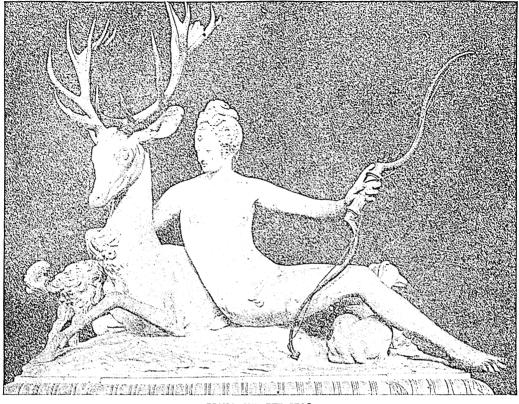
The most powerful influence has been that of the Paris schools and studios, in which numerous American sculptors have sought inspiration and knowledge. The best representatives of modern sculpture in the United States have



"THE INNER VOICE"
An example of modern French sculpture. [By Rodin; now in the Rodin Museum, Paris.]

been Saint Gaudens and his gifted pupil Frederick MacMonnies; Daniel Chester French, Paul Bartlett, George Grey Barnard, Gutzon Borglum, H. A. Lukeman, and Lorado Taft.

Sculpture of Today. Rodin, whose influence on modern sculpture may be compared with that of Michelangelo on Renaissance Italian sculpture, died in 1917. The dominating feature of his later work—emphasizing the essential and characteristic—led to the revolt of younger artists. To the vorticists in England, post-impressionists in France, and futurists in Italy, Rodin seemed a conservative. Constantin Braucusi, a Rumanian, who studied in Paris, and Archipenko are the most famous exponents of the modern movement. Jacob



DIANA AND THE STAG An example of the French school. [By Jean Goujon; now in the Louvre, Paris.]

Epstein, American, who studied in Paris and did much work in England, created endless discussion with his panel for the Hudson Memorial in Hyde Park. Ivan Mestrovic, in 1924 national sculptor of Yugoslavia, shows in his equestrian Indian figures in Grant Park, Chicago, dramatic power and feeling for rhythm.

Although the United States has no national school of sculpture and has been strongly influenced by Paris, its sculptors have been conservative, and their work fulfills all the canons of academic art. Daniel Chester French, the dean of American sculptors, exhibited his good taste and pure form in the colossal seated Lincoln for the Memorial in Washington. Jo Davidson, Mahonri Young, Hunt Diedrich, Gertrude Vanderbilt Whitney, and Janet Scudder are later Americans.

In Germany and the countries which were once a part of Austria (now Ostmark), sculpture after World War I was characterized by a striving for realism.

Related Subjects. The reader is referred to:

Alto-Rilievo Bas-Relief Bust Carving

Colossus Elgin Marbles Liberty, Statue of Mezzo-Rilievo

Parthenon Relief Sphinx Venus de Milo

Algardi, Alessandro Amadeo, Giovanni Antonio Ball, Thomas Barnard, George Grey Bartholdi, Frederic A. Bartlett, Paul Wayland Borglum, Gutzon Brown, Henry Kirke Canova, Antonio Cellini, Benvenuto Crawford, Thomas David, Pierre Jean Donatello Dürer, Albrecht French, Daniel Chester Ghiberti, Lorenzo Goujon, Jean Greenough, Horatio Hosmer, Harriet Houdon, Jean Antoine Leighton, Frederick

Lukeman, H. Augustus

Lysippus

MacMonnies, Frederick SCURVY, skur' vi, a disease resulting from improper diet. When the daily food is lacking in certain elements found in fresh foods, particularly fruits and vegetables, important

changes in the blood occur, causing lassitude,

Winged Bull Winged Lion Winged Victory

Wood Carving

Michelangelo Buonarroti

Partridge, William Ordway Phidias Powers, Hiram Praxiteles Rauch, Christian Remington, Frederic Rietschel, Ernst Robbia, Della Rodin, Auguste Rogers, John Rogers, Randolph Rude, François Saint Gaudens, Augustus Schilling, Johann Stoss, Veit Swan, John Macallan Taft, Lorado Thorwaldsen, Bertel Vinci, Leonardo da Ward, John Q. A. Watts, George F.

anaemia, tenderness and swelling of the joints, and functional disturbances. Especially characteristic are the effects seen in the mouth, for the gums become swollen and spongy, they bleed easily, and the teeth may loosen and fall out.

In the days of long sea voyages, when the sailors lived on salt beef and hard tack for weeks at a time, scurvy was very common on ships. Changes in conditions of sea travel and modern research in dietetics have made this disease comparatively rare both on land and sea, except in prison camps during war, and among the poor. Scurvy of babies, however, due to faulty feeding, may occur among the well-to-do.

Scurvy is prevented and cured by including in the diet foods that contain the scurvy-preventing Vitamin C (see VITAMINS). Especially valuable foods of this class are the citrus fruits, tomatoes (either raw or cooked), raw cabbage and lettuce, celery and onions, cress, fresh carrots, and potatoes. Attention to sanitation is also important, and treatment may include the use of antiseptic mouth lotions and blood tonics. Freshness of foods is a necessary quality in the prevention and cure of scurvy.

Infantile scurvy, called Barlow's disease, is apt to attack a child after it has been taken

from the breast. Orange or tomato juice should be given regularly to infants after they are weaned, and also to those fed by bottle, after the first month. W.A.E.

SCUTARI, skoo' tah re. See Albania; Constantinople.

SCUTCHING, skuch' ing. See FLAX.

SCYLLA, sil'-ah, in Greek myth-

ology, a six-headed sea monster, who was once a beautiful maiden, but was changed by Circe because of the latter's jealousy. She lived in a cave in a great cliff, so high that the top could never be seen. It was her custom to thrust her heads out of the cave and seize the animals and men that passed. From every ship, each head took toll. Opposite the cliff of Scylla was Charybdis, another monster who continually drew in the water and threw it out again, thus keeping the sea in turmoil. The ancients located the rock Scylla and the whirlpool Charybdis in the Strait of Messina, Scylla being the one next the Italian shore. According

to Homer, when Ulysses passed between Scylla and Charybdis, the former snatched six men from his vessels. See Whirlpool; Odyssey.

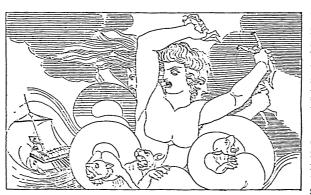
Modern Application. The difficulty of steering between the rock and the whirlpool gave rise to the expression, "between Scylla and Charybdis," as indicating two evils, one of which must be chosen.

SCYTHE, a curved blade with a long handle, used to mow such crops as ripe grain. See REAPING MACHINE (illustration, page 6014).

SCYTHIANS, sith' ih anz, a nomad people of Asia, who inhabited the treeless plains from the Danube to the Volga. They were herdsmen, lived in covered wagons, and were filthy in their habits, never washing their bodies. They drank out of the skulls of the enemies they killed. In the seventh century B.C., the Scythians invaded Media. After ten years' occupation, Cyaxares got rid of them by making their chiefs drunk at a banquet, and then killing them. Most of them were exterminated, however, in the fourth century, by the Sarmatians. About 128 B.C., they overthrew Parthia (Persia). They invaded They invaded India about 125 B.C., and remained there for five centuries, when they became supporters of Buddhism. Some have attempted to prove that Buddha was of Scythian descent.

SEA, DEPTH OF. See OCEAN (Depths). SEA ANEMONE, a nem' o ne, a sea animal

which is so called because it has much the appearance of a flower. The sea anemones, with the jellyfishes and corals, are placed in the phylum Coelenterata (which see), the third lowest major division in the animal kingdom. As may be seen by the illustration, sea anemones differ somewhat in size and form, but, in general, the

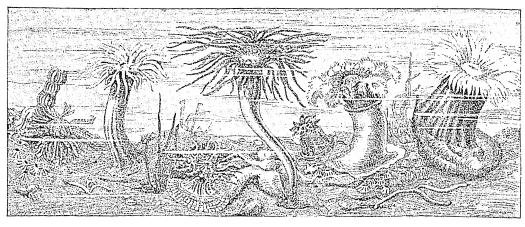


SCYLLA

[From a design by Flaxman.]

body is vaselike, with fringes of tentacles about the mouth. The average diameter is three inches, and the bodies show varying hues of bright colors. These animals usually remain fixed through life to rocks or other places of attachment, but they have the power of slowly moving along on the base of the body. They are found in tide pools and on piles of wharves in harbors, as well as in deep waters.

It is by means of its tentacles that the sea anemone obtains its food, which consists of a variety of small sea animals. Certain tentacles are equipped with so-called stinging or nettle cells, which throw out barbed threads that



VARIOUS FORMS OF SEA ANEMONES

paralyze the creatures they strike. The prey is then dragged into the mouth cavity by other tentacles, and digested in a single body cavity. Some of the tentacles bear pigment spots that serve as organs of sight. Sea anemones reproduce by eggs, by equal division, and by budding; in the last case, the new organism grows out from the base of the body and is finally detached, forming a new individual.

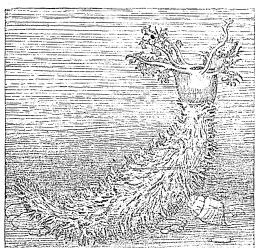
S.H.S.

Scientific Name. Sea anemones belong to the class Actinozoa. A common species is Metridium marginatum.

SEA BEAR, a name applied to the fur seal. See SEAL (The Fur Seal).

SEA COW. See MANATEE.

SEA CUCUMBER, ku' kum bur, one of a class of marine animals related to sea urchins, sea lilies, and starfish (all of which see). They



SEA CUCUMBER

have long, rounded bodies, shaped somewhat like the familiar garden vegetable. At one end of the body there is a large mouth opening, encircled by a series of branching tentacles. These the animal expands and contracts as it seizes its food. It has five double rows of tube feet, which can be extended and used as organs of locomotion. There are several hundred species, found in all parts of the ocean. Those inhabiting tropical waters sometimes grow to be two or three feet long, but the sea cucumbers of temperate regions are only a few inches in length. Large numbers are caught in the East Indies and sent to Chinese markets as trepang (which see).

Classification. Sea cucumbers constitute the class Holothurioidea in the phylum Echinodermata (see Echinoderms).

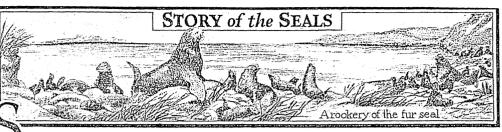
SEA ELEPHANT, OR ELEPHANT SEAL. See SEAL (Other Seals).

SEA FLOWERS. See COELENTERATA; Hydra; SEA ANEMONE; SEA LILIES.

SEAGER, se' gur, HENRY ROGERS (1870-1930), an American economist, born in Lansing, Mich., and educated in the United States at the universities of Michigan and Pennsylvania and at Johns Hopkins. He also studied abroad at the universities of Halle, Berlin, and Vienna. Seager became assistant professor of political economy at the University of Pennsylvania in 1896. In 1902 he joined the faculty of Columbia University where, in 1905, he was made a professor. He was especially interested in labor and trust problems. He was a member of the board of editors of the Political Science Quarterly. At the time of his death, Seager was one of a party of American economists who were visiting Russia to make a study of the Soviet Five-Year Plan.

Writings. Seager's writings include Introduction to Economics; Economics, Briefer Course; Social Insurance; Principles of Economics; History of the Shipbuilding Labor Adjustment Board; Practical Problems in Economics; and Trust and Corporation Problems.

SEA HORSE. See HIPPOCAMPUS. SEA-ISLAND COTTON. See COTTON. SEA KALE. See CHARD. \$...



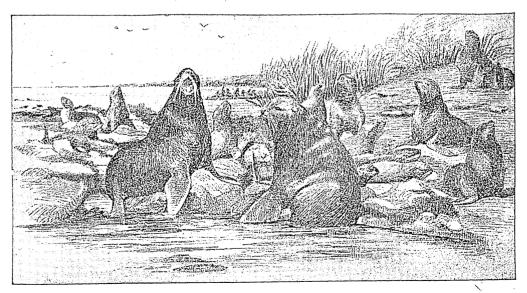
EAL, a strangely formed, warm-blooded, air-breathing animal which has its various body structures so modified that it is able to live in the water as well as on the land. However, except at the mating season, seals spend most of their time in the sea.

What a Seal Looks Like. If seen on land, a seal is incredibly awkward, but in the water, it is beautiful and graceful. It has a tapering body, with thick, woolly fur and long, shining hair, and is so sleek and oily that it glides easily through the water, finlike feet serving as paddles and as rudder. Particularly graceful are the quick, darting movements with which it seizes upon its prey of small fish. A seal has a tail, but it is so short as to be practically useless, while the limbs also are short, the greater part of their length being hidden beneath the skin. The head is small and round, the neck short, the mouth large and provided with numerous "feelers," like those of the cat.

Where Seals Live. The Caspian Sea and Lake Baikal have two species of seals, but with these exceptions, all members of the family live in the ocean. For the most part, they do not like the warm climates, though a few species do live in the seas of the temperate and tropic zones. But toward the far north and the far

south, the sea teems with them. They tumble about in the water most of the year, but at breeding time are to be seen in vast numbers on the shore rocks and the icebergs. It is not only their thick coat of fur, or hair, which protects them from the extreme cold, but the layer of fat, or blubber, which lies just under the skin. Intended thus solely for their protection, this blubber has contributed to their destruction, for it is one of the things which men much desire as an article of commerce.

Intelligence of Seals. Seals of one species or another have long been familiar in zoölogical gardens, where children have delighted to watch their awkward movements, as they draw themselves up on the rocks, and to listen to their hoarse barking; but in recent years, men have found another way to make these animals contribute to their amusement, and trained seals are now an important part of almost every circus. Just because they are so lumbering and awkward, and seem so much farther down in the scale of life than any of the land animals, the tricks which they perform seem almost incredible. Some students claim that their ability to learn is a sign of their superior intelligence, while others declare that it is but the outgrowth of instinct, and of a desire for



FUR SEALS, SOURCES OF THE FUR IN SEALSKIN COATS

the fish which the keeper gives them at intervals.

Certain it is that seals in their native haunts seem far from intelligent. The homing instinct they possess to perfection, coming back each year to the same breeding spot as unswervingly as a bird returns to its last year's nesting tree; but that suggests a lack of intelligence rather than the contrary, for it is on these breeding spots that they are most likely to meet with destruction at the hands of men.

The life habits of seals are very interesting. As they have been studied most closely in con-

nection with the fur seal, they will be discussed in the section of this article devoted to that species.

Kinds of Seals. A thoroughly satisfactory classification of seals has never been made, but a simple, serviceable division separates them into two groups; these are the eared seals, which have

external ears and for the most part soft fur under their long hair, and the true seals, which have no external ears and no fur. To the former group belong the fur seal, or sea bear, and the sea lion; while in the latter are included the common seal, or harbor seal, the harp seal, abundant off Newfoundland (which see), and the elephant seal, or sea elephant. In zoölogical classification, the seals are placed with the walruses in the group of flesh-eating mammals called water carnivores (see Carnivorous Animals; Walrus).

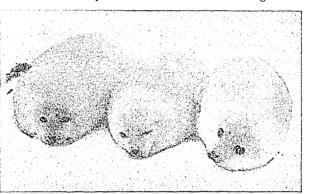
The Fur Seal

By far the most important commercially of all the seals is the fur seal. It has another name—sea bear—which is perhaps better than its usual one, for it seems to be more closely related to the bears than to the true seals. True, it likes fish, and it spends much of its time in the water; but beyond that, its seal-like points are few, while structurally it is very much like a bear. It can move about on land far more easily and rapidly than does the true seal, scaling the rocks and even running in a lumbering manner. What makes the sea bear so valuable is the soft, dense fur, usually brownish-black, which is almost hidden by the outer hair. A live seal is not beautiful and soft and glossy like a sealskin coat, for the long outer hair is coarse and grayish (see section on page 6468, Securing Sealskins).

Life Habits. Time was when there were great herds of these seals, but they have been killed literally by millions for their fur, and to-day the few herds that remain are very small as compared with their former size. Fear has been felt that they might become extinct. Most important of all the fur seals is the herd, forming a distinct species, which makes its home on the Pribilof Islands (which see), a barren group in Bering Sea.

Fascinating indeed has been the study of the curiously ordered life they live there, and men of science have sought the islands as eagerly as

have the fur traders. Through the winter, the seals which make up this herd are scattered about the waters of the North Pacific: some of them never leave the icy seas about Alaska. but others venture as far south as the coast of Califor-But wherever they may be, when spring



BABY SEALS

comes, instinct leads them back to the desolate little islands. By thousands they arrive, the old males, or bulls, first; and many of them have some specially favored places which they seize each year, by driving out or killing any intruder. A seal bull is a formidable creature, frequently weighing as much as 400 pounds, and he regulates his household and his surroundings as he sees fit.

Several weeks after the bulls have arrived, the females, or cows, come; they are graceful, gentle creatures, usually not more than onefourth as large as their lords and masters. These seals are polygamists; each bull gathers about him as many females as he can, sometimes as many as a hundred, and over these he exercises the strictest care. Other bulls will try to steal them, but this he is prepared for; and to prevent it, he will fight viciously. Hundreds of the females are torn in pieces every year by these contending males, and the rocks echo and reëcho with the roaring of the fighters. Strangely enough, through all of this period of exertion, the males fast; they do not taste food from spring until about August.

Soon after the adjustment into households is completed, the little seals, or pups, are born. They are sleek, squirmy little animals, weighing about ten pounds each, and from the first, are as playful as kittens. Soon after her baby's arrival, the mother seal becomes hungry, and swims away in search of food. The little seals are left in a great group, or pod, hundreds of



A Graceful Pose and a Deadly Aim. An Eskimo hunter with harpoon poised above a blowhole, waiting for a seal to come up for air. One has fallen a victim to his skill. The natives depend on the seal for heat, light, food, and clothing.

them together, with absolutely no mark to distinguish one from another, but the mother on her return, after a week's absence, has no difficulty in identifying her offspring; unerringly, she picks out her own pup, now clamorously anxious for food. Attempts have been made to show that these mother seals have a real affection for their young, but the tales of their devotion have been much exaggerated. The theory, however, has given rise to at least one charming poem, Kipling's Seal's Lullaby, in which he says:

Oh, hush thee, my baby, the night is behind us, And black are the waters that sparkled so green; The moon, o'er the combers, looks downward to find us

At rest in the hollows that rustle between. Where billow meets billow, there soft be thy pillow; Ah, weary wee flipperling, curl at thy ease! The storm shall not wake thee, nor shark overtake thee,

Asleep in the arms of the slow-swinging seas.

A group of young seals learning to swim is a most amusing sight. The six-weeks-old

babies do not "take to water like a duck," for their heads are very heavy, and the rest of their bodies disproportionately light, and they find as great difficulty keeping themselves in swimming position as

do young birds when first learning to fly. Until November or December, according to the weather, the herd remains on its favorite rookery. Discipline is relaxed, and the females and young bulls are no longer dominated and terrorized by the old bulls. There then comes a day when the seal instinct says "Go," and the great herd puts off into the sea until another spring shall come round. On several other groups of islands, some belonging to Russia and some to Japan, are other herds of fur seals, but none is so large or so important as this Pribilof Island herd.

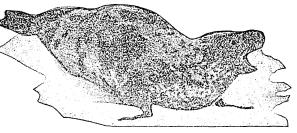
Securing Sealskins. The young males are the class killed for fur, for there are as many males born as females, and since every bull has a large harem, many of the males are unnecessary. Since the old bulls will not allow them to set up families until they are seven or eight years old, the young males herd by themselves, and the hunters kill them by clubbing them when they are on land. The skinswhich must be removed carefully, as a cut skin is rejected—are salted and packed in the holds of vessels until the close of the season. A long process is gone through before these rough,

hairy pelts become the beautiful skins that are placed on the market. The coarse gray hair is removed, leaving the soft fur exposed, and the skin is carefully dyed, not by dipping, but by repeated treating with a brush.

Fur-Seal Legislation. When the United States purchased Alaska, in 1867, there were said to be 3,000,000 seals in the herd on the Pribilof Islands (which see). The Federal Government extended to the Alaska Commercial Company, soon after the purchase of the territory, the exclusive right to kill seals. Not long after the year 1880, people from the mainland of North America, from British Columbia in particular, and also from Japan, discovered that they could go out in boats to the high seas, intercept the seals in their migration, and kill enough to make the business very profitable. By 1910 this practice, called pelagic sealing, had reduced the number of fur seals to less than 200,000.

The United States, Great Britain, Russia, and Japan all recognized that the seal herd was an important economic resource and should

be conserved. Therefore, these countries signed a fifteen-year treaty in 1911 which made pelagic sealing unlawful. The following concessions were made: the United States gave 15 per cent of the land catch on the Alaskan islands



HOODED SEAL

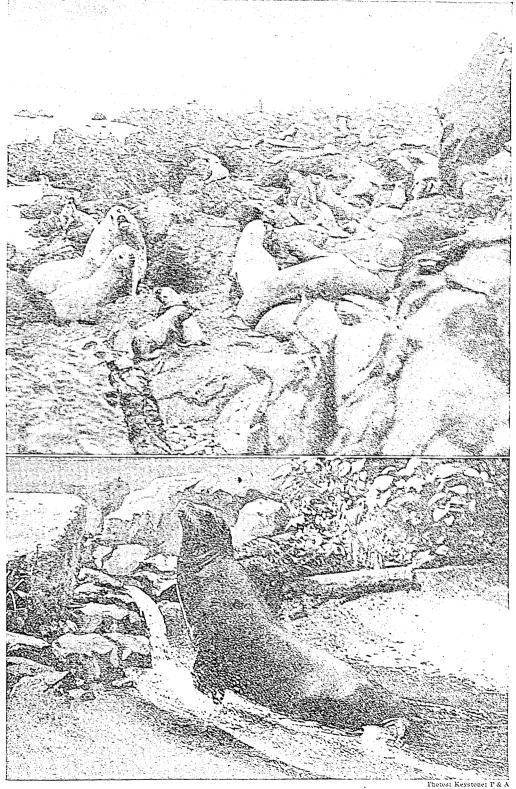
to Great Britain and Japan; Russia gave these countries the same percentage of the catch on the Commander Islands; and Japan surrendered 10 per cent of its catch on the Kurile Islands to the United States, Great Britain, and Russia. Renewed in 1926 for another fifteen years, the treaty was terminated in 1941 by Japan because the herd (about 2,000,000) was becoming a menace to its fishing industry. In 1912, the United States also passed a law forbidding seal-killing on land for a period of five years. The annual take has been increased to 60,000 (male) seals.

The fur seal is highly polygamous; one male for every forty or fifty females is all that is necessary for breeding purposes. It is known that the young seals are about equally divided as to sex, so that it is evident that, for every forty males born, thirty-nine of them can be killed for their skins without endangering

normal increase of the herd.

Other Seals

Sea Lion. This is another eared seal, a near relative of the fur seal, from which, however, it differs in one important point. It is a hair



Sea Lions. Above, a rookery on the Santa Barbara Islands, off the coast of California. Below, a lone sea lion waits expectantly for his dinner.

seal, that is, it has not the soft under fur which makes the other so valuable commercially. There are two chief groups of sea lions—the so-called Steller group and the California sea lions. The former reach the greatest size of any of the eared seals, the males attaining a length of from ten to fifteen feet and a weight of from 1,000 to 1,300 pounds. In all the Northern Pacific, from California to Japan, these huge animals are to be found, and the Indians of the Aleutian Islands count them among their chief prizes. They eat the flesh, either fresh or dried, use the skins for boat coverings and the flippers for boot soles, blow up the stomach to serve as an oil bag, and make thread of the sinews.

The other sea lions are those timid, gentle creatures which are seen on the Cliff House rocks at San Francisco (see page 6367). They are much smaller than the species described above, and are almost black. Nearly all the seals seen in menageries are of this species.

True Seals. Of the true seals, the commonest is the little, yellowish-brown harbor seal, which is an interesting visitor in Atlantic ports. Like the fur seals, the harbor seals are in danger of extermination, for, while they have no fur, they yield a valuable oil, and their skin is used for leather. Strangely enough, this animal shows a real delight in musical sounds, but its own voice is a sort of bleat which has won for the animal the name of sea calf. Another species of true seal is the hooded, so named because the male has a hoodlike sac upon the head. It is an inhabitant of the North Atlantic and the Arctic oceans.

Sea Elephant, or Elephant Seal. This is the largest of the true seals, a huge creature which may measure thirty feet in length. It is a hideous-appearing animal, with its small eyes, long, tusklike teeth, and the short, wrinkled trunk which gave it its name; but it is very valuable, for a single male has been known to yield over 200 gallons of oil. Formerly, sea elephants were numerous along the coasts of Lower California and Mexico, and great rookeries existed as far north as Santa Barbara, but, like other members of the seal tribe, the sea elephants have been ruthlessly slaughtered until now they find a peaceful home only on some of the islands in the Southern Pacific. In their manner of life, they much resemble the fur seals, especially in the fights which the males wage for possession of the females, and in their fondness for their chosen spots.

Scientific Names. True seals constitute the family *Phocidae*; the eared seals, the family *Otariidae*. The fur seal of the Pribilof Islands is *Callorhinus alascanus*; the sea lion of the North Pacific is *Eumetopias stelleri*; the California sea lion is *Zalophus californicus*. The harbor seal is *Phoca vitulina*; the harp seal, *Phoca greenlandica*; the hooded seal, *Cystophora cristala*; the sea elephant, *Macrorhinus leoninus*.

SEAL, usually a figure, lettering, or other device impressed on paper, metal, or wax, to be attached to a document, together with a signature. Seals are made from a matrix or metal die, and sometimes from a gem. The practice of using a seal on documents of importance has been followed without interruption since the fifth century before Christ, in the golden age of Greece. In Rome the Popes very early began to attach leaden seals to their official communications; these seals, called bullae, gave rise to the bull of the Popes.

In olden times, it was customary to wear a ring, called a *signet ring*, flattened at the top, on which was engraved some special device. This was ordinarily an ornamental finger ring, and was used to seal letters and documents, the design being pressed on a drop of hot wax on the surface of the parchment or paper. The seal ring of the present day is the development of the older signet ring. The legal expression of "signed, sealed, and delivered" is a relic of the times when both signature and seal were necessary to prove authenticity of letters.

Seals of Government. Every country, province, and state has an official seal, without which no legislative act can go into effect. Such a seal must be affixed by the Secretary of State, in whose custody the official seal reposes. The legislative branch of a government—Congress, state legislature, or Parliament—decides upon the character of the seal, which, when once adopted, cannot be changed except by the same lawmaking authority.

Great Seal of the United States. On the day the thirteen American colonies proclaimed their independence (July 4, 1776), Benjamin Franklin, Thomas Jefferson, and John Adams were appointed a committee "to prepare a device for a Great Seal of the United States." Their report followed in sixty days, but was not acted upon. In 1782 a seal was proposed which was acceptable to Congress and was adopted. It was not changed until 1885, when the Congress ordered a new design. Both sides of the present seal are shown in the article United States. The olive branch and arrows denote the hope for peace and the power for war, both peace and war being subject to the will of Congress, which is typified in the eagle. The constellation denotes the thirteen original states of the Union; the escutcheon is borne unsupported on the breast of the eagle, denoting that the country should rely solely upon its own strength and virtues. The pyramid on the reverse side signifies duration and solidity. The eye above it, and the motto above the eye, refer to the many interpositions of Providence in favor of the American people. The date (1776) in Roman numerals and the lower motto signify the beginning of a new era at that time.

Derivation. The word seal is derived from the Latin sigillum, meaning a little mark or sign. This is the diminutive of signum.

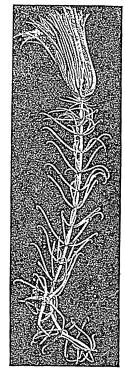
SEA LILIES, OR CRINOIDEA, kri noi' dihah, a class of strange and lovely sea animals, now very few in number. Some species are found in shallow water about coral reefs, either attached or free-swimming. A typical form has a cup-shaped head, or calyx, which contains the vital organs, and a jointed limestony stem.

About the head radiate the feather-like arms which make the animal look like a flower, whence the name sea lily. The arms screen from the water tiny shellfish and particles of plant life, which are passed along grooves to the mouth. Many carboniferous limestones are almost entirely made up of the brittle stems of these animals, and there is a remarkable slab of fossil forms in the United States National Museum. Crinoidea are classed with the echinoderms (which see). S.H.S.

SEALINE, a fur. See RABBIT.

SEALING, a rite of the Mormon Church. See Mormons.

SEALING WAX, a composition of rosin, shellac, turpentine, magnesia, chalk, or



SEA LILIES

gypsum, and coloring matter, used for sealing letters and documents and for taking the impression of seals (which see). Before the invention of envelopes with gummed flaps, sealing wax was in general use for sealing letters, but now it is seldom employed for that purpose. That used for letters and documents is colored with vermilion and placed on the market in the form of sticks. An inferior grade used for sealing packages is usually colored with lampblack. An inexpensive wax for sealing bottles and cans of preserved fruit is made by mixing nine parts rosin with one part beeswax, and heating the mixture until melted. If coloring matter is desired, lampblack or ocher may be used. The necks of the bottles should be dipped in the wax. Sealing wax is supposed to have been invented by the Chinese in the seventh century, but before its composition was known to the Europeans, they used beeswax. G.M.S.

SEA LION. See SEAL (Other Seals).

SEA LOCH. See FIORD.

SEA MOUNTAINS, the Anglicized name of the range called SERRA DO MAR. See BRAZIL (Highlands and Lowlands).

SEANCE, sa' ahns. See Spiritualism.

SEA NECKLACE. See CONCH.

SEANAD EIREANN, the upper house of the Irish Free State Parliament. It was abolished in 1936. See IRELAND, page 3524.

SEA OF JAPAN, BATTLE OF. See RUSSO-JAPANESE WAR.

SEA ONION. See Squill.

SEA PARROT. See PUFFIN.

SEA PIE. See OYSTER CATCHER.

SEA PIGEON. See GUILLEMOT.

SEAPLANE OR HYDROPLANE, aircraft built to land upon or take off from water.

SEA RAVEÑ. See Sculpin.

SEARCH, RIGHT OF. A nation at war has the right under international law to visit and search merchant ships of neutral nations for the purpose of verifying the nationality of the vessel, and of ascertaining whether or not the cargo includes property of the enemy, or merchandise that is contraband of war (see CONTRABAND). The visitation and search must be made by the officers of a warship of the belligerent.

Right of search is not permissible in times of peace, except when a cruiser is sent in pursuit of a merchant vessel suspected of violating the revenue laws. Formerly, pirate vessels were included in this category, but piracy, except for an occasional outbreak in the Far East,

is a thing of the past.

In making the search, the ship's papers are first examined. These papers contain the names of the master, of the ship, the port from which the ship has sailed, and the port for which it is bound. The papers should also contain a description of the cargo, and should certify that the officers have complied with the customs regulations of the country from which it has sailed. If the papers are correct, the search usually ends with their examination. If, however, suspicion is aroused, the cargo is examined. Any officer refusing to stop his ship and to allow it to be searched is liable to have both ship and cargo confiscated.

The Hague Conference of 1907 and the conference in London in 1909 threw a number of restrictions around the right of search. One of these was that the mails of neutral nations should be free from search, and that in case the neutral vessel was detained these mails should be forwarded at the earliest possible date. However, the allied nations set this and various other provisions of these conventions temporarily aside soon after the outbreak of World War I, as a necessary measure against spies, and Germany's submarines sank both enemy and neutral ships without warning.

By international agreement during this nation's prohibition era, territorial limits were extended from three to twelve miles. This agreement, which relates to search for smuggled articles, remains in force. For other purposes, the limit is still three miles.

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Extensive use of the right of search was made by England during World War II. Ships were stopped at British control stations and thousands of tons bound for enemy ports con-

The right of search in times of peace, in so far as it applies to the private premises, persons, and property of American citizens is safeguarded by law. See Warrant (Search Warrant).

SEARCHLIGHT. See ELECTRIC LIGHT (The

Arc Light).

SEA SALT, ORIGIN OF. See OCEAN.

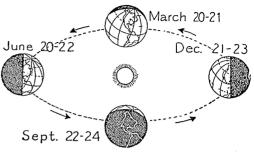
SEASICKNESS, a disagreeable illness resulting from the pitching and rolling of a vessel at sea. The symptoms are dizziness and pain in the head, nausea, a sinking sensation in the stomach, and vomiting. In case of a severe attack, the skin becomes pale, almost green, and damp, the pulse is feeble, and the person is exhausted. Of several theories advanced to account for seasickness, the one most generally accepted attributes the ailment to disturbance of equilibrium in the semicircular canals of the ears (see EAR). The same type of disturbance is experienced by those people who become ill from swaying in a hammock or swing.

Persons susceptible to seasickness may lessen the severity of attacks. During the week preceding the voyage, care should be taken to keep the bowels active, and the diet should be simple but nourishing. It is well to eat plenty of fresh fruits and vegetables, and avoid heavy, rich foods. Sufficient sleep and exercise in the open every day will help. If a susceptible person begins the voyage in good condition, he stands a better chance of avoiding the disagreeable sensations. Lying quietly in a steamer chair on deck, with the eyes closed, helps to overcome the nausea if the sea is rough. In case of a bad attack, it is best to stay in one's berth, but the cabin should have good ventilation.

Seasick persons differ in their reactions to food and drink. Some are benefited by abstaining from solid food for a day or more, but if the attack is long-continued, the ship's doctor should take charge of the case, to see that the patient does not suffer collapse. The ailment is never fatal unless its severity brings on complications; in that case, one must have medical advice. Some success has been attained from the use of sodium nitrate, given in doses of three to five grains every two hours. This drug is believed to counteract the stimulation of the vestibule of the ear.

Why some persons are absolutely immune to seasickness, and others are made ill by slight motion, has never been determined.

SEASONS, the periods into which the year is naturally divided, by changes in temperature, and by alterations in the lengths of the days and nights. In the course of a year, the earth revolves around the sun, always with its axis tipped or inclined 231/2° toward the plane of its orbit. For about half the year, the vertical rays fall north of the equator. About the 21st of June, they are farthest north.



THE SEASONS

In summer, the northern part of the earth is more than half in sunshine, and the southern part is more Thus, a point in the north than half in darkness. has daylight during the greater part of the twenty-four hours of the day. The farther north one goes, the more daylight he finds; and around the Pole there is no darkness during this season. In the winter, conditions are reversed.

and on that day, summer begins in the northern hemisphere and winter in the southern. On the 22nd of December, the conditions are exactly reversed. About the 20th of March, the sun is at the vernal equinox, and about the 23rd of September, at the autumnal equinox; on these days, the sun is directly over the equator. In the northern hemisphere, spring and autumn, respectively, begin on these days. Thus spring extends from the vernal equinox (March 20) to the summer solstice (June 21); summer, from the summer solstice to the autumnal equinox (September 23); autumn, from the autumnal equinox to the winter solstice (December 22); and winter, from the winter solstice to the vernal equinox.

The four periods described above are the astronomical seasons, but, actually, the seasonal changes are not so clearly defined. In the Temperate zones, there are four periods generally comparable to the astronomical seasons, but in the Torrid Zone, there is usually only a wet and a dry season. The Polar regions, too, have only two seasons, winter and summer. Ordinarily, in the northern hemisphere the months of March, April, and May are called the spring months; June, July, and August, the summer; September, October, and November, the autumn; and December, January, and February, the winter In the southern hemisphere, the seasons are reversed, spring beginning in September, summer in December, autumn in March, and winter in June.

Related Subjects. The reader is referred in these volumes to the following articles:

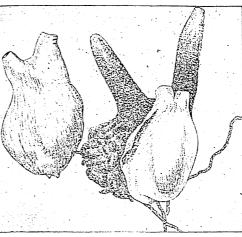
Astronomy

Equator

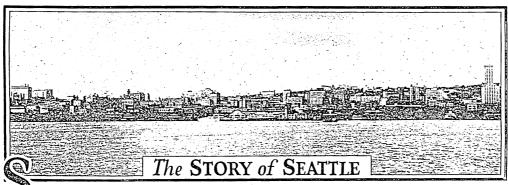
Solstice

SEA SQUIRTS, skwurts, or ASCIDIANS, as id' ih anz, a group of marine animals whose common name has reference to their habit of ejecting water through one of two body open-The adult sea squirts have leathery, bottle-shaped bodies which remain attached through life to stones, shells, and other fixed objects. Some live in colonies. The larva, a free-swimming creature resembling the tadpole of a frog, possesses a notochord, or elastic rod, which extends through the tail. For this reason, modern zoölogists place ascidians in the same main division as vertebrate animals, for they regard the notochord as a rudimentary backbone. In this classification, the larger division is called Chordata [see Zoology (Divisions of the Animal World); VERTEBRATES]. After a few days, the larva loses many of its organs. The adult animal receives food from water taken into the digestive tract through an opening found near the one from which water is ejected. These openings are at the

end of a projection called the *siphon*. S.H.S SEA TROUT. See SALMON TROUT; TROUT.



SEA SQUIRTS



EATTLE, se at' 'l, Wash., the largest city of the Pacific Northwest, the county seat of King County, and one of the most important seaports on the Pacific coast of America, is situated on the east shore of Puget Sound, 926 miles by water north of San Francisco, and 183 miles by rail north of Portland, Ore. The Canadian boundary is 125 miles to the north. Population, 368,302 (1940).

General Description. Seattle lies in the heart of a scenic region, the Evergreen Playground of Puget Sound, with the snow-capped Olympic Mountains and the Sound on the west, and Lake Washington and the Cascade Range on the east. Lake Washington, a body of fresh water twenty-seven miles long and four miles wide, is connected with Puget Sound by a ship canal more than eight miles in length. The canal passes through Lake Union, another fresh-water lake in the north-central part of the city, and connects with the Sound by means of locks, second in size only to those of the Panama Canal. A third body of fresh water, Green Lake, lies within the heart of this attractively located city.

From the shores of these Sound and inland waters rise the hills of this metropolis, which has been described by world travelers as comparable to Constantinople in the beauty of its site. Its hills make Seattle's homes "view" places, built on sites giving vistas of the commercial and business district, and of the waters of the lakes and inland sea. These hills, however, when they have offered obstacles to the city's progress, have been removed. Jackson Street, for instance, was lowered 124 feet, Denny Hill was lowered 130 feet, and a section of Third Avenue was graded down, at a cost of millions of dollars. Valuable business centers were thus created. An extensive regrade project, just north of the business district, and known as the Denny Hill Regrade, gives the city a broad arterial highway to the north, and makes a valuable district available for expansion.

Most of the streets, which are broad and straight, and cross at right angles, extend approximately north and south and east and west. The manufacturing and wholesale district borders on Puget Sound, and the financial

district extends from a point close to the bay into the retail business district. All parts of the city are connected by a trackless trolley-bus system, municipally owned; and motor coaches, as well as railways, extend to neighboring cities in western Washington.

Parks and Boulevards. Seattle has forty-

three parks, twenty-four miles of scenic boulevard, and forty-six playfields. The combined area of its recreation facilities is 2,910 acres. Many of the parks occupy commanding elevations, and most of them have been left in their natural state. The playgrounds, for the most part, have been developed for recreation, and have instructors on duty throughout the school year. Flowers and shrubbery, which flourish nearly all the year in the mild climate of the city, add greatly to Seattle's scenic beauty.

Buildings. Seattle constantly adds to its business structures. Some of the most important are the twenty-two-story Exchange Building, the twenty-seven-

story Northern Life Tower, rising 446 feet above sea level and 331 feet above the sidewalk; the Medical and Dental Building, at Fifth, Stewart, and Westlake; the Bon Marché Building; the forty-twostory L. C. Smith Building; the Rhodes Department Store structure on Second Avenue; and the Dexter Horton Building. The Seattle Art Museum in Volunteer Park and the Henry Art Gallery, on the University of Wash-

ington campus, are centers of culture. Seattle also has a million-dollar civic auditorium, centrally located.

Education. The University of Washington is the largest institution for higher learning in the Pacific Northwest (see Washington [Edu-On its campus are twenty-three cation]). beautiful buildings in Tudor-Gothic style of architecture. Seattle College, Seattle Pacific College, the Academy of the Holy Names, and the Cornish School of Music, Drama, and Dance are all schools of a high order of excellence.

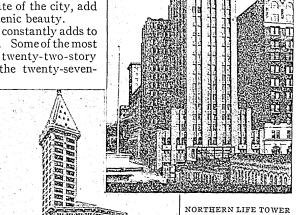
Transportation and Commerce. Four transcontinental railways—the Great Northern, the Northern Pacific, the Union Pacific, and the Chicago, Milwaukee, Saint Paul & Pacifichave their western terminals in Seattle. The Southern Pacific and the Chicago, Burlington & Quincy also enter the city, through arrange-

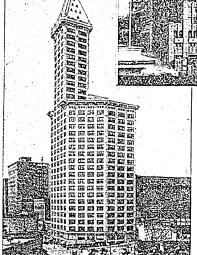
ment with other lines, and the Canadian Pacific and Canadian National railways are available by fast steamship connection. There is regular steamship service on Puget Sound with Vancouver, B. C., and intermediate ports, and excellent ferry service to Bremerton, the site of a United States navy yard. Seattle is a center of excellent motor routes giving ready access to Mount Rainier, the Cascades, the Hood Canal region, and other places of scenic interest.

The city's public harbor-terminal improvements comprise seven groups of port utilities, including wharves, transit sheds, coldstorage facilities, grain elevators, and the most modern steam and electric freight-handling devices. The port is served by 110 foreign and domestic steamship lines, and does a tremendous business with all the ports of the world. Seattle is the closest American port to the Orient and Alaska, and serves a vast hinterland which is a rich fruit-growing and agricultural region. The port re-

ceives nearly three-fourths of all raw silk entering the United States, the great volume of silk imports giving Seattle first place, among American Pacific ports, in America's vast foreign trade.

Industries. Over \$135,000,000 is invested in Seattle's 1,500 industrial plants, which employ over 42,000 workers. Favored by an equable climate, large amounts of hydroelectric power, and enormous supplies of raw materials, close by, the city is developing steadily as a manufacturing center. Flour-milling and the manufacture of airplanes and lumber and lumber products are outstanding industries; other





L. C. SMITH BUILDING

the

founders of Seattle landed at Alki Point in 1851, the city was not settled until 1852, according to the

reckoning of his-

torians. Four years later, it

survived an at-

tack by Indians,

and was incor-

porated as a city

in 1869. The first railroad came in 1884.

The business dis-

trict was wiped

out by fire in

1889. Seattle

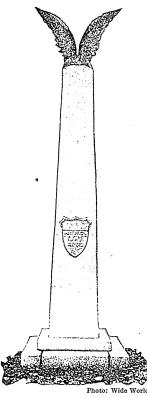
was rebuilt after

that fire, al-

though many of

of the fishing industry for Alaska and the Northwest. Great quantities of salmon, halibut, and cod are packed or shipped in ice, and the salmon canneries are among the city's most flourishing enterprises. History. though

products made here include textiles, iron and steel goods, stone and clay products, and transportation equipment. Seattle is the chief center



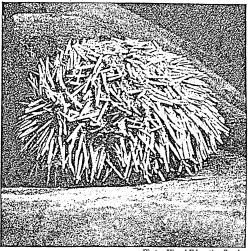
COMMEMORATING AN HISTORIC EVENT

Monument erected on the aviation field in Seattle where the 'round - the - world fliers began their epochal journey in 1924 and where the flight ended after six of the aviators had flown 27,534 miles, in 371 flying hours.

the buildings which went up in the nineties have been replaced by skyscrapers.

The first trans-Pacific steamship service, that with Japan, was established in 1896. The gold rush came in 1897, and Seattle was the outfitting port for Alaska. Its growth began in earnest from that time. In 1909 the Alaska-Yukon-Pacific Exposition was held in Seattle, for the purpose of displaying the resources of Alaska. Panama Canal steamship service to Atlantic ports came in 1914, and was followed by trade with all the world. In 1923 the city adopted a zoning ordinance, and in 1924 it completed the first unit of a hydroelectric development on the Skagit River, with a total potential capacity of 1,120,000 horse power. See illustration, page 6476. SEA UNICORN. See NARWHAL.

SEA URCHIN, an animal belonging to the same group as the starfishes, sea lilies, and sea cucumbers, having the body covered with tiny limestone plates bearing hinged spines. "Without its spines," says one authority,



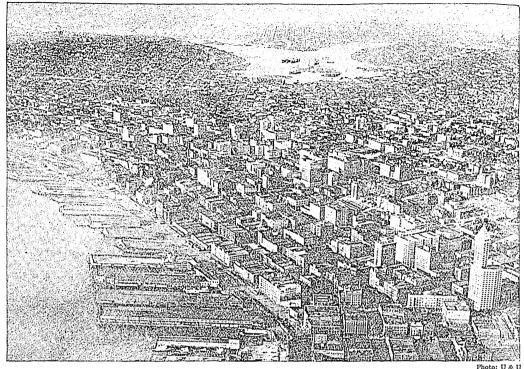
SEA URCHIN

"a sea urchin looks like an old-fashioned door knob." On its lower surface, the sea urchin has a circular opening containing the mouth; on the upper surface are the openings through which the eggs emerge. Through tiny holes in the body covering, the animal thrusts out tube feet having sucking discs. With these suckers it draws small animals into its large mouth, which has five sharp teeth for grinding the food. The tube feet are used also as organs of locomotion, and some of them are employed as feeling tentacles. The various species are found on rocky shores, in sand, and in deep water. A sea urchin found on the California coast can burrow holes into solid rock. These animals all reproduce by eggs. Some species are sold as food.

Classification. Sea urchins constitute the class Echinoidea in the major division Echinodermata (see ECHINODERMS).

SEA WALNUTS. See JELLYFISH.

SEAWEED, in popular usage, any plant that grows in the sea. In a botanical sense, the name refers chiefly to the brown and red algae. Seaweeds are thus related to the green pond scums of stagnant water, but not to the more highly organized aquatic plants. The seaweeds of cold waters are chiefly brown algae; those of the tropics are red algae. The masses of seaweed through which the ships of Columbus passed on his first voyage to the New World were brown algae known as gulfweeds. Other brown algae are the giant kelps of the Pacific. The stems of these giant kelps sometimes grow to over a hundred feet in length. During the World War, these seaweeds were harvested and converted into



AIRPLANE VIEW OF SEATTLE (SEE PAGES 6473-6475)

Thev fertilizers and materials for explosives. are one source of the chemical element iodine. Irish moss, an edible seaweed, belongs to the red algae.

Related Subjects. For further information on this subject, see, in these volumes, the following articles:

Algae

Irish Moss

Water Plants

SEBACEOUS, se ba' shus, GLANDS. See

SEBASTIAN, se bas' chan, SAINT (died A.D. 288), one of the early defenders of the Christian faith, who was put to death by the Emperor Diocletian. He entered the Roman army without revealing his intent to assist and protect the Christians, found favor with the emperor, and became commander of the first cohort at Milan. His religious faith having been discovered, he was condemned to death, tied to a tree, and shot with arrows by a troop of archers. He was left as dead, but life was not extinct, and he was cared for in the home of a Christian lady named Irene. After his recovery, he again publicly professed his faith. Thereupon the emperor ordered him to be beaten to death with clubs, in the amphitheater. He was buried in the catacombs. The earlier martyrdom of Saint Sebastian was a favorite subject of the early Italian painters. His day is January 20.

SEBASTOPOL, se bas' toh pohl, officially SEVASTOPOL. See CRIMEA (The Cities).

See Dan-SEBORRHOEA, seb o re' ah. DRUFF.

SECESSION, se sesh' un, Ordinance of. See War of Secession (Movements Toward Disunion)

SECOND. See MINUTE.

SECONDARY EDUCATION. See Educa-TION (Elementary and Secondary Education).

SECOND EMPIRE. See France (Reaction and New Discontent).

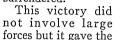
"SECOND SIGHT." See Conjuring; CLAIR VOYANCE.

SECORD, LAURA (1775-1868), a Canadian heroine, born in Massachusetts, whose courage gave the British a victory in the Battle of Beaver Dam, during the War of 1812. In 1813, in the midst of the Niagara campaign, the British forces had been retiring before the enemy until Sir John Harvey checked the American advance at Stony Creek. As a result of Harvey's victory, the British stationed a force of about fifty regulars and 500 Mohawk Indians at Beaver Dam, about halfway between Stony Creek and the Niagara River, to prevent further encroachments.

The Americans planned to surprise and capture this force at Beaver Dam. James Secord, wounded militia officer then living at Queenston, overheard several Americans discussing these plans. He himself was unable to warn the force at the Dam, but his wife, Laura Secord, undertook the errand. Driving

a cow before her until she reached the woods, in order to avoid suspicion, she then set forth on a tramp of twenty miles, through dense forests, in constant danger from lurking Indians or from Americans. It was an all-day

tramp, and Mrs. Secord was quite exhausted when she finally gave the warning to the British commander. When the Americans then advanced to the attack, the British and their Indian allies were ready, and started such a fierce fire that the American commander thought himself surrounded by a large force, and surrendered.





A MEMORIAL "To perpetuate the name and fame of Laura Secord."

Canadians much encouragement. Mrs. Secord became famous in a day. After the close of the war, she lived quietly for many years in a little cottage at Niagara which is still pointed out to visitors

SECRETARY, sek' re ta rie, BIRD, a falconlike bird of large size, about four feet long, found in South Africa. It takes its name from



SECRETARY BIRD

the tufts of feathers that project from the sides and back of its head, giving it a resemblance to a clerk, or secretary, with quill pens behind his ears. It has very long legs and tail, and ordinarily, it prefers to run rather than to fly. Its food includes frogs, insects, lizards, small tortoises, and snakes. The last it may strike with its wings or feet; or perhaps it flies with its victim high in the air, and kills it by letting it fall to the ground. In the Cape of Good Hope Province, a fine is imposed for killing the bird, because of its destruction of snakes. It builds a bulky nest, in a tree or bush. The eggs, two or three in number, are a dull white, spotted with rust color.

The South African farmers sometimes tame secretary birds and keep them about their buildings to destroy the vermin, but unless the birds are well fed, they are likely to kill and eat the poultry.

D.L.

Scientific Name. The secretary bird is the only representative of the family Serpentariidae. Its scientific name is Serpentarius secretarius.

SECRETARIES OF DEPARTMENTS. See Cabinet.

SECRETION, se kre' shun, in physiology, is the process by which various glands or membranes of the body separate certain materials from the blood and form them into new fluids. These fluids are called secretions. Examples are bile, secreted by the liver; gastric juice, made by digestive glands; saliva, poured from the salivary glands; and the lubricating fluid (synovia) which keeps the joint surfaces working smoothly. The fluids mentioned are known as true secretions, because they each have a special work to do. There are other fluids, known as excretions, which are separated from the blood by secreting glands, but which differ from true secretions in that they are discharged from the body as waste matter. Examples of excretions are urine and perspiration. K.A.E.

Related Subjects. The following articles, in these volumes, may profitably be read in connection with this subject:

 Bile
 Kidneys
 Pancreas

 Digestion
 Liver
 Perspiration

 Glands
 Membranes
 Saliva

 Joints
 Mucus
 Urine

SECRET SERVICE. Frederick the Great founded the modern secret-service organization, and it was his boast that his spies outnumbered his cooks a hundred to one. The story is well known, of the secret agents who, in advance of the Prussian invasion of Austria (1862-1866), disguised as peddlers, traveled through Austria and made careful observations of the topography, in addition to the most detailed preparation for the invasion. All countries use secret methods to protect themselves from the violation of national law, and against enemies at home and abroad.

The United States Secret Service came into existence in 1864, to detect and arrest counterfeiters of the currency, and is one of the oldest government law-enforcement agencies. Organized originally for the suppression of

counterfeiting, the Secret Service in 1901, after the assassination of President McKinley, was delegated by Congress to protect the President of the United States, members of his immediate family, and the President-elect. High dignitaries of foreign countries are usually accorded a secret-service escort.

Inasmuch as the office was intended from the beginning to war on counterfeiters, it was made a bureau of the Treasury Department, and has always remained as such. The bureau is presided over by a chief, whose office is in Washington. There are fifteen headquarters offices throughout the country, each headed by a supervising agent, and thirty-five suboffices, each conducted by an agent-in-charge.

At no other period in the world's history did the various nations make such extended use of their respective secret-service departments as in World War I. Stories of spies were current everywhere at that time, and though many of the alleged happenings were partly fictitious, none will deny the powerful effect of the work of the Secret Service. The German system was probably the best organized, and millions of dollars were expended on it. The personnel of the United States Secret Service during World War I was able, but inadequate. Yet it was the secret-service agent who obtained from Dr. Heinrich Albert, German secret agent, documents which exposed Count Von Bernstorff, then German Ambassador, and frustrated extensive plots against the United States. This exposure resulted in the American demand that Germany recall Franz Von Papen, later Chancellor of Germany, and Captain Boy Ed, ace German spy. The Secret Service was also successful in uncovering violations of the Food Administration regulations, and of export regulations of the War Trade Board, under the act regulating trading with the enemy.

SECURITIES AND EXCHANGE COM-MISSION, a Federal organization created in 1934, largely for the purpose of protecting investors. The statutes administered by the commission provide for disclosure to investors of material facts regarding public offerings of new security issues; also for the regulation or supervision of exchanges and other stocktrading groups. The commission is composed of five members appointed by the president, with the advice and consent of the Senate, for terms of five years. Not more than three members may be of the same political party.

SECRET SOCIETIES. See Fraternal Societies.

SECTION (land). See Lands, Public. SEDALIA, se da' lih ah, Mo. See Missouri (back of map).

SEDAN, seh dahn', BATTLE OF. See FRANCO-

GERMAN WAR.

SEDATIVE, sed' a tiv, a drug or other remedy that exerts a soothing influence on the human system, or on some part of it. When acting on the system, sedatives produce their effects by affecting the central nervous system; they affect a part of the body by acting upon the ends of certain sensory nerves. Ice caps and cold compresses are effective sedatives for a stimulated heart, and are soothing in fever. These are examples of local remedies. Cocaine is a sedative drug that has local effects. Chloroform and ether are examples of general sedatives that produce sleep when inhaled. Sulphonal and veronal produce sleep by acting principally upon the brain. Bromides and nitrite affect the nerve centers of the spinal cord; bismuth and hydrocyanic acid are stomach sedatives. These drugs vary in their effects; the same one may soothe one part and excite another, and one administered in small quantities may alleviate pain, and in large quantities may irritate. They should never be used except as prescribed by a physician.

[Anesthetics, anodynes, narcotics, and hypnotics are different types of sedatives. See Anesthetic; Anodynes;

SEDGE, the name of a large family of plants closely resembling the grasses. Many species are found growing in clumps in damp places in almost all parts of the world. In the sedges, the sheath which enfolds the stem is entirely closed, and the stems, often triangular, are usually solid; but the grasses almost always have the stem sheath split on one side, and this difference is sometimes the only feature by which the average nature-lover can tell the two apart. The spikelets of sedge flowers are small, each floweret being enclosed by one scale instead of by several, as in the grasses. The tubers of some species are good to eat; from the fragrant roots of others, perfumes are made; while the Egyptian papyrus, another species, had many important uses in antiquity, and is still utilized for making paper, cordage, and coarse cloth. See Papyrus.

[The botanical name of the sedge family is Cyper-

SEDGWICK, ANNE DOUGLAS (1873-1935), an American-born author, who lived in England and wrote about the conflict between French and English ideas and ideals. Anne Sedgwick, a serious little girl of nine, stood on the deck of a ship sailing for France, and watched the Statue of Liberty slowly disappear. In the years that followed, she never returned to live in Englewood, N. J., where she was born. There were lessons with the governess, holidays on the Continent, and the study of painting in Paris. Her talent for painting developed in her a sense of color and an eye for natural beauty which have made her descriptive passages most vivid.

Although she exhibited at the Champ de Mars, Miss Sedgwick gave up painting as a career, and began writing, but it was several years before she gained public recognition. Her marriage in 1908, to Basil de Selincourt, a scholar of French descent living in England, had a decided influence on her literary career. Three years after her marriage, Tante, her first novel of importance, appeared, but it was not until 1924 that her Little French Girl established her fame securely on both sides of the Atlantic. This fascinating story of the contrast between English and French ideals and standards is an outstanding novel.

Other Writings. These include A Childhood in Brittany Eighty Years Ago, The Dull Miss Archinard, The Confounding of Camelia, The Rescue, Paths of Judgment, The Shadow of Life, A Fountain Scaled, Amabel Channice, Franklin Winslow Kane, The Nest, The Encounter, Christmas Roses, The Third Window, Adrienne Toner, The Old Countess, Dark Hester, and Philippa.

SEDIMENTARY ROCKS are rocks that have been deposited by the agency of water or wind. The materials of which sedimentary rocks are made may have their origin in matter produced by organisms found in the sea, such as carbonate of lime made by minute animal life. Limestone is the sedimentary deposit formed from this material. Out of gravel are formed conglomerates; sandstone is the compacted form of sand; shale, of silt and clay (mud). Sedimentary rocks are usually formed in layers, and in such cases are said to be stratified. A single layer is called

Related Subjects. The reader is referred in these volumes to the following articles:

Geology Rock Shale Limestone Sandstone Stratified Rocks

SEDITION, se dish' un, an act which is not serious enough to be treasonable, but which induces discontent against constituted authority. Seditious conduct is a step toward treason, lacking only an overt act to make it that greatest of crimes. One crisis in American history which recognized and defined sedition in a statute occurred when the Alien and Sedition Laws (which see) were passed by Congress, in 1708.

During World War I, certain emergency acts were passed by Congress. The Espionage Act of June 15, 1917, among other provisions, prohibited the gathering of information to be disclosed to the enemy, such as plans for defense, disposition of armed forces, location of dock yards, arsenals, and munition plants. The next year an amendment to the act provided punishments for the publication of disloyal statements intended to cripple or hinder the prosecution of the war, and for seditious speeches. After the entry of the United States into World War II, the Espionage Act was again enforced, especially against Axis-employed agitators whose purpose was to undermine the war effort and weaken the country by stirring up one racial group against another.

SEE. See ARCHBISHOP.

SEED DISPERSAL. See SEEDS, subtitle.
SEEDER. See Sowing Machine.



EEDS. The plant grows to bear a flower, and the flower blooms to produce a fruit. The chief part of the fruit in respect to the plant is the seed, for it is that part from which another plant grows.

"First a seed so tiny
Hidden from the sight,
Then two pretty leaflets
Struggling toward the light;
Soon a bud appearing
Turns into a flower,
Kissed by golden sunshine,
Washed by silver shower."

Not all plants have seeds; among the seedless groups are ferns, mosses, fungi, and seaweeds, which reproduce by spores (see Spore). Some seeds may be very old, and yet will grow. It

is claimed that lotus seeds three centuries old have germinated, and there is proof of the sprouting of clover seed twenty years old. Tales of live grain seed, found buried with mummies thousands of years old, are mere fabrications.

Parts of a Seed. The parts of a seed are the tiny infant plant, or embryo, the food for the embryo, and the seed coat, which is a protective covering. The coat may be thin and smooth, as in the bean, or thick, rough, and hard, as in the peach pit. The food for the embryo, which consists chiefly of starch and albumen, is stored around the embryo, as in buckwheat and corn; or it may be almost entirely absorbed by the embryo, which nearly fills the space enclosed by the seed coat. This

is usually the plan in small seeds, but it is also characteristic of the bean, pea, and other seeds of comparatively large size. In Fig. 1, a, b, d, and e show these parts of the seed. In a the embryo is in the center of the lower part of

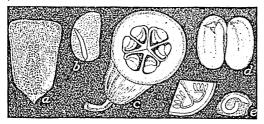


FIG. I

(a) Cross section of a grain of corn; (b) cross section of asparagus seed; (c) cross section of squash and one carpel; (d) common bean, split open; (e) cross section of onion seed.

the seed; d represents a bean which has been soaked in water and then opened, to reveal the embryo. A study of Fig. 2 shows other seeds, in which the position and shape of the embryo may be distinctly seen. These illustrations indicate that no two plants have seeds exactly alike.

Botanists have divided all flowering plants into three great divisions, in accordance with the number and arrangement of the seed leaves. They are described immediately below.

When a bean or a squash seed germinates, two thick leaves, shaped like the halves of the



FIG. 2

(a) Lengthwise section of a pansy seed; (b) lengthwise section of a buttercup seed; (c) capsule of violet, split open, showing seeds attached to placentae; (d) cross section of iris capsule; (e) lengthwise section of poppy seed.

seed, are lifted above the soil, and are the first objects to appear above the ground. Between them, we see the first bud, or plumule, ready to put forth its leaves. The two thick leaves contain the reserve food, and when the food has been absorbed by the growing plantlet, they wither and fall. They are known as seed leaves, or cotyledons, a name which comes from a Greek word meaning hollow or cuplike. In order that seeds may germinate, they must be supplied with moisture, warmth, and air.

When corn germinates, no true seed leaves appear above the ground. If we look at the kernel of corn (a, Fig. 1), we see that the embryo is surrounded by plant food upon all sides. We cannot divide the corn into halves as we can the bean, because this food is all

stored in one mass. That is, the corn has only one seed leaf, or cotyledon. All plants having seeds with only one cotyledon are called *monocotyledonous* plants. Corn, wheat, oats, barley, and grasses are good examples of plants belonging to this division.

We have seen that the bean and squash produce seeds with two seed leaves. All plants with seeds having two seed leaves are called dicotyledonous plants. The maple, elm, oak, alfalfa, and clover, besides the other plants named, are good examples of this division. Cone-bearing trees produce seeds with more than two seed leaves, and form the division of polycotyledonous plants. It should be noted that cone-bearers belong to the plant group having naked, or exposed, seeds, the gymnosperms. Monocotyledons and dicotyledons are angiosperms, and bear seeds enclosed in cases. One needs to know the meaning of

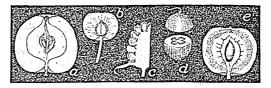
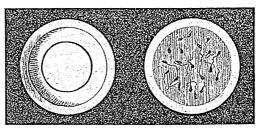


FIG. 3

(a) Lengthwise section of apple, showing position of seeds in center;
 (b) lengthwise section of cherry, with seed in center;
 (c) lengthwise section of part of blackberry;
 (d) cross section of cranberry;
 (e) lengthwise section of part of blackberry;

these terms, because they are frequently met with in botanical descriptions of plants.

A study of the arrangement of seeds in the seed vessel or fruit leads to some of the most curious and interesting facts connected with the study of plants. How many can tell the direction in which the seeds of the apple point? (See a, Fig. 3.) Does the pit of the peach point in the same direction? (See e, Fig. 3.) Notice how the seeds are arranged in the squash (c, Fig. 1); in the iris (d, Fig. 2), and in the cranberry (d, Fig. 3). In the blackberry (c, Fig. 3), they are attached to the outside of



SEED TESTING
A simple device for testing seeds in sand.

a fleshy receptacle, but each seed is enclosed in a little, pulpy fruit. In the strawberry, the seed is on the outside of the fleshy receptacle. Notice the ingenious method by which the seeds are packed into these capsules or pods. By no other arrangement could the same

number of seeds be crowded into the space. Make a collection of seed vessels before they open, and observe the arrangement of the seeds in each.

Seed Adulteration. The seeds of some cultivated plants so closely resemble those of worthless plants that these seeds may be mixed, and no one but an expert can detect the fraud. To illustrate, the seeds of peppergrass, dodder, crab grass, and sorrel may be mixed with timothy seed, and kale and mustard may be mixed with 'turnip seed. It is difficult to obtain pure seed for planting, because weeds grow with the crop and are necessarily harvested with it. While most of the weed seeds are separated from the grain at thrashing, some remain, and if sowed the next season, they produce another crop of weeds. A large number of fanning mills have been invented for the purpose of enabling the farmer to obtain pure

1	
1	2
3	4
.5	6
7	8
9	10
11	12

SEED TESTING
How cloth is marked.

seed for planting. Some states have laws requiring that seeds to be sold for planting shall be tested before being offered in the market.

Seed Testing. The importance of securing a good crop makes it advisable for the farmer to test his seed before planting. A simple device consists of two plates of the same size. Lay a piece of blotting paper in one plate, first marking it off into squares two inches in diame-Pour enough water into the plate to moisten the paper, and then lay ten seeds to be tested in each square. Cover them with another piece of blotting paper, or with a damp cloth, and cover this by turning the second plate over the first. Keep the blotter moist, and set the plates where the temperature will be about the same as that of the soil at the time of planting. In eight or ten days, the seed should have germinated (sprouted). Count the number of seeds in each square that have germinated, and from this count you can readily calculate the percentage of good seed in the original lot.

A strip of muslin, nine inches wide and a yard long, marked as shown in the cut, is convenient for testing seed corn. Test as many ears as there are squares on the cloth, numbering each ear to correspond with the square in which kernels taken from it are placed. Place a round stick on the blank end of the cloth, and roll it up gently, taking care not to disturb the kernels. Tie the roll loosely, and place it in water overnight; then bury in damp sawdust or sand, and keep it at a temperature of 65° or 70° until the corn germinates. A box of sand marked off into squares by strings or wires is more convenient for testing a large quantity of seeds.

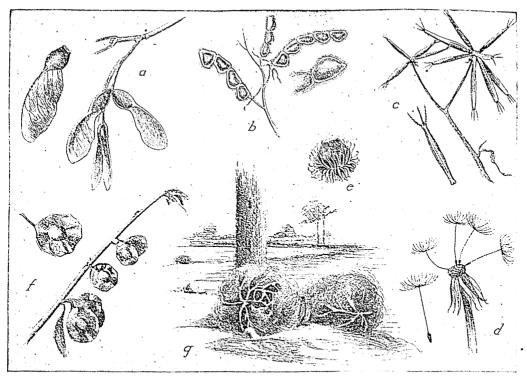
Use of Seeds. The purpose of the seed in nature is to reproduce the plant, and almost every plant produces a large number of seeds, but only a part of these grow. Some are eaten by birds and animals, some are destroyed by fire and other agencies, and some fall upon rocks or in water, where they cannot germinate. But the greatest use of seeds is for food for man and domestic animals. By far the greater part of the food of all the people in the world consists of seeds. In America and Europe, wheat, corn, rye, oats, and barley are the grains most extensively grown for food. In Asia rice is the chief article of food; hence the world over, growing seeds (grain) is the chief occupation of the agriculturist.

Seed Dispersal

The fruits of many plants are so constructed that they aid in seed dissemination; that is, in their dispersal by wind, water, and animals. The seeds themselves are fitted for long journeys, and can withstand conditions that would kill most plants. Some seeds remain in good condition for long periods of time, and, as noted above, there are records of the germination of seeds buried for three centuries. It is

not true, however, that seed buried in Egyptian tombs, and planted after thousands of years of storage, have sprouted and flourished. Though long believed authentic, stories to this effect have no basis in fact. Guides fraudulently smuggle modern wheat into tombs, and travelers find it.

The seeds of wild plants are sown in unimaginable numbers by natural agencies each



SOME OF NATURE'S MEANS OF SEED DISPERSAL

(a) Winged seed of the maple; (b) burs of "sticktights"; (c) seeds of Spanish needles; (d) dandelion seeds; (e) burdock seeds; (f) winged fruits (seeds) of American elm; (g) tumbleweeds blown by the wind.

year, making good the loss of vegetation due to all destructive causes. Owing to the lack of sufficiently thorough and rapid distribution, insect and plant enemies, and unfavorable conditions, only a small proportion of the seeds produce new plants. When ripe, many seeds detach themselves from the fruit; others, by various devices of nature, and by atmospheric conditions, are brought from their shelter at the proper time.

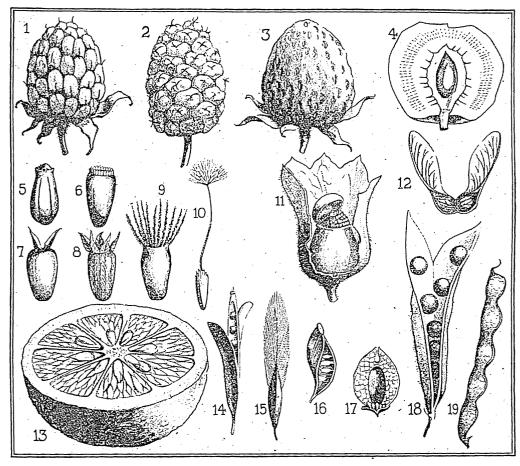
Dispersal by Wind. The wind is the chief agent in scattering seeds. Some dustlike seeds, like those of the orchid, float in the air, and others are provided with downy, tufted para-The tufted seeds of the chutes or wings. thistle and dandelion and those embedded in soft wool and silken hair, such as the cotton, poplar, and milkweed seeds, are detached from their beds by the dry winds and warm sun, and are blown long distances. The seeds of the maple, elm, and ailanthus are equipped with membranous wings, and in others the fanlike petals of the dry calyx form the sails or parachutes which carry them to distant places. The wings and parachutes of some seeds become detached after the journey through the air; others remain on the seed, and serve to fasten it in some place favorable for germination.

Whole clusters of fruits containing seeds, such as the white pine cone, are also blown from

place to place. The smooth, light fruits of tropical plants, like the "steppe witches," are rolled for miles over the level, barren steppes until they fall into some crack in the clay or are lodged in a hole, where the seed germinates and produces a new plant. In such plants as the tumbleweed, the stalk is detached from the roots when the seeds are ripe, and as the plant is blown from place to place, it scatters its thousands of seeds.

Perhaps the most curious and interesting natural seed-scatterers are the "sling fruits" and "catapult fruits." In the former, the tissues around the ripened seeds become highly tense and burst their outer covering, which then contracts with a violent jerk, forcibly expelling the seeds as from a sling. In some plants, the seeds are expelled by the drying up of the pod, or the spiral twisting of the valves of the fruit. The catapult fruits, such as the light pods of the poppy and morning-glory, are open at the top, and when the stalks are bent or swayed to and fro, they rebound, flinging the seeds in all directions from the top of the pod.

Dispersal by Water. Water and moisture are also important agents in the dispersal of seeds. Water plants, such as the lotus and also some varieties of palms, have floating seeds containing air, which buoys them up to the surface, and



HOW SOME SEEDS GROW

(1) Raspberry. (2) Mulberry. (3) Strawberry. (4) Stone fruit of apricot, cross section. (5) Camomile. (6) Rainfern. (7) Sunflower. (8) Black currant. (9) Cornflower. (10) Dandelion. (11) Henbane. (12) Wing fruit of maple tree. (13) Orange. (14) Crossflower. (15) Wing fruit of ash tree. (16) Buttercup. (17) Fruit of birch tree. (18-19) Legumes.

after floating for months, they will germinate when lodged in the soil. It is believed that the uninhabited islands of the South Seas have been planted, in this way, with coco palms.

The roses of Jericho scatter their seeds, not when the winds are dry, but in moisture and rain. The tightly curled fruits are untwisted and opened by dampness; the seeds are then washed out by the rain. The capsules of the ice plants are similarly opened by the rain, and another interesting action of moisture in the distribution of seeds is seen in the hopping or creeping fruits of the plants of the hot plains. These fruits have a stiff bristle projecting from one side, which changes its position with atmospheric changes, thus propelling the fruit by causing it to hop or spring along the ground.

Dispersal by Animals. Other seeds are readily carried by animals. The fruits are provided with sharp spikes, hooks, or claws which catch in the animal's fur or man's cloth-

ing. These burs are sometimes, like the catapult fruits, thrown at the passing animal by the swaying plant. The stalks of some plants are claws, and, carrying the seed with them, cling to any rough surface with which they come in contact.

The seeds of edible fruits also are widely scattered by man and animals. The fruits of the wild cherry, currant, and raspberry are often carried long distances by birds. They are then eaten, and the seed either dropped to the ground, or later expelled from the crop. This explains how wild cherry and apple trees spring up in woods and meadows, and how bittersweet and berry bushes come to grow in the forks of trees. Migratory birds carry seeds in the mud which clings to their claws when they are startled into flight. Nuts are carried to new places by squirrels and other animals, which bury them and often leave them to germinate the following spring.

B.M.D.

Related Subjects. The reader is referred in these volumes to the following articles:

Angiosperms Botany Cotyledon Cross-Pollination Flowers Fruit

Germination Grains Gymnosperms Plant

Pollen and Pollination Spore

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SEED TESTING. See SEEDS, subhead.

SEEGER, ALAN (1888-1916), an American poet, killed in the World War, who left at least one poem that has become a permanent part of the literature inspired by that conflict. Seeger was born in New York City, but spent a part of his youth in Mexico City. After his graduation, at Harvard University, he went to Paris. At the outbreak of the World War. he enlisted in the French Foreign Legion. One day, just before he went "over the top" with his infantry company, he had a premonition of death, which inspired the poem that has immortalized his name. On July 4, 1916, he and his comrades were ordered to clear a village of the enemy; in the first advance, he was wounded, and his body was found on the battlefield. The poem which told of his premonition of death was called I Have a Rendezvous with Death.

Seeger's Poems. Seeger began writing poems in his college days. In December, 1916, his verses were put into book form. They include an early effort entitled Juvenilia, several sonnets, translations of Italian verse, and his war poems. One of the latter was an Ode in Memory of the American Volunteers Fallen in France; it was composed in two days, while he lay in the trenches.

SEEING EYE, THE, an institution near Morristown, N. J., engaged in training dogs to lead the blind. By the use of trained dogs, blind persons are able to overcome their greatest handicap, that of getting about the streets safely. In order to serve the blind, the dogs must be taught to lead and obey their owners, as well as to disobey commands which would be dangerous to carry out. They must also learn to lead their masters around overhanging obstructions, such as awnings and branches, under which the dogs could walk, but where the masters could not follow.

Three months are required for training the dogs, and another month is needed for the master and dog to become accustomed to working together. Nearly all dogs used for this purpose are German Shepherds, often called "police dogs." They are best for this work because they are of medium height, have a coat suitable for all kinds of weather, and are strong. They are also comparatively easy to teach, and seem able to take and carry out responsibility well. See Shepherd Dog.

SEELAND, another form of Zealand. See DENMARK (Physical Features).

SEGOVIA, say go' ve ah, RIVER. See HONDURAS.

SEIDL, zi' d'l, Anton (1850-1898), a noted Hungarian musical conductor, whose name is identified with the production of Wagner's music dramas. As an interpreter of Wagner, Seidl ranks with Hans Richter. He was born at Budapest, and was trained in the Leipzig Conservatory. At the age of twenty-two, he was considered such an accurate musician that Wagner called him to Bayreuth, Germany, to be one of his copyists. Seidl became an intense admirer of Wagner, and assisted in the first of the famous Bayreuth Festivals, in 1876. Subsequently, on the recommendation of Wagner, the young musician was appointed conductor at the Stadt Theater of Leipzig, and there, until 1882, he brought forth the greater German operas in a manner that won him fame. In June, 1882, he presented Wagner's Trilogy in London, and roused to enthusiasm an audience previously rather indifferent to Wagnerian work. In 1885 he succeeded Leopold Damrosch as conductor of German opera in New York, and during that year, his orchestra attained such fame that he could fill only a small portion of the engagements offered. He was one of the conductors at Bayreuth in 1896, and conducted at Covent Garden, London, in 1897. Seidl died in New York. In 1900, two years after his death, his widow published a memorial Life.

SEIDLITZ, sed' lits, POWDERS, a laxative, fizzing preparation, consisting of two separate powders which are taken together. They are usually put up in blue and white papers, the blue containing tartrate of soda and potash (Rochelle salts), with bicarbonate of soda, the white one containing tartaric acid. powders are dissolved separately in two halffilled tumblers of water, and one solution is then poured into the other. Effervescence begins immediately, and the draught should be taken at once. The powders give better effects when taken on an empty stomach; they produce a gentle, relieving action of the bowels. See Salts; Soda.

[The name Seidlitz is that of a village in Northern Bohemia, where a mineral water with similar effects is found.]

SEIGNIORAGE, seen' yur aje. See Money (Free Coinage).

SEIMAS, sa' mas, the legislative body of

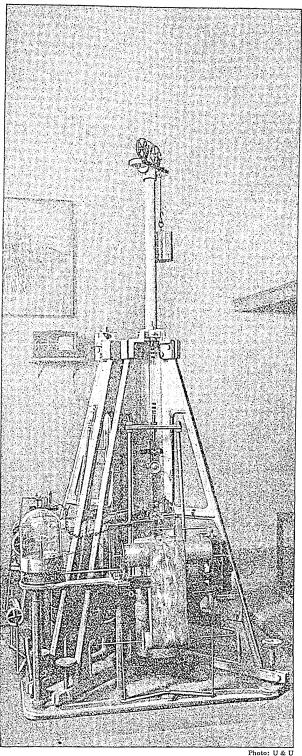
Lithuania (which see).

SEINE, sayn, RIVER. Eighteen miles northwest of Dijon, the statue of a nymph marks the spot where the most famous river of France rises. The narrow little stream winds to the northwestward, and 235 miles away becomes the broad river which flows through the city of Paris (which see). On the left bank of the Seine, at Paris, are the Latin Quarter, the Sorbonne, and the Luxembourg Gardens; on the right bank are the Louvre, the Champs Elyseés, and the Trocadéro; and on an island stands the Cathedral of Notre Dame. Of the many fine bridges that cross this stream, the Alexander III is especially beautiful.

Small, sturdy boats carrying placid French families ply northward on the Seine past Saint Cloud. where wealth and fashion gather for the races; past Saint Germain, with its handsome palace; through pleasant country, sometimes as far as Rouen, where seagoing boats are docked. South of Paris, the Seine flows through Fontainebleau, between wheat fields and peach orchards and the renowned vineyards of the Côte-d'Or.

The Seine is not only a winding, picturesque river. but a waterway of commercial importance. It is joined by the Aube, Marne, Meuse, Yonne, and Oise, and is connected by canals with the Loire, the Rhone, the Rhine, the Meuse, and the Scheldt. There is also a ship canal skirting the north shore of the estuary, between Havre and Tancarville. The Seine is navigable for 337 miles of its total length of about 480 miles.

At least seven notable floods of the Seine have

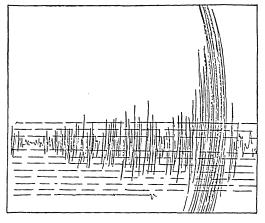


MODERN TYPE OF SEISMOGRAPH Georgetown University, Washington, D. C.

been recorded. During the flood of 1910, the river rose over twenty-four feet, with disastrous results.

SEISMOGRAPH, sise' mo graf, an instrument which records the occurrence of an earthquake and indicates its force and direction. One of the seismographs used universally at the present time is shown in the illustration. It has an inverted pendulum, held in a vertical plane by springs whose elasticity neutralizes the effect of gravity. The record of the earth disturbance is produced photographically upon a moving strip of sensitized paper or film. Through the Coast and Geodetic Survey, the United States government maintains several seismograph stations in the United States and its possessions.

The earliest seismograph known was made in China, centuries ago, by a man named Choko. Modern instruments are so delicately adjusted that scientists in any part of the world are able to record earthquakes occurring at any other point on the globe. Quite often, shocks are recorded of which the world never hears particulars. In May, 1927, severe earth vibrations were recorded by seismograph observatories in various parts of the world, and the accumulated data indicated that a disastrous earthquake had occurred in the Kansu province in China. So



A SEISMOGRAPH RECORD

remote from news facilities is this region that it was two months before detailed information was available. Then it was learned that 100,ooo persons had perished. See Earthquake; Volcano.

SEISMOLOGY, sise mol' o jie, the science of earthquakes. See EARTHQUAKE, subhead; Seismograph.

SELAH, se' lah, a Hebrew word of uncertain origin occurring seventy-one times in the Psalms, as well as in Habakkuk III, 3, 9, and 13, and retained in the English authorized version of the Bible. It is supposed to indicate a pause or natural break in a hymn. One authority has suggested that it is a direction to the singers to "lift up their voices." SELECTION. See Breeding.

SELECTIVE DRAFT LAW. See ARMY; CON-SCRIPTION; UNITED STATES IN WORLD WAR II.

SELECTIVITY. See RADIO COMMUNICA-TION (Glossary of Radio Terms).

SELENITE, sel' e nite. See GYPSUM.

SELENIUM, se le' nih um. See CHEMISTRY (The Elements).

SELEUCUS NICATOR, se lu' kus nik' a tor. See Syria (The Cities: Antioch).

SELF-BINDER. See REAPING MACHINE.

SELF-DENYING ORDINANCE. During the Civil War between Charles I and the English Parliament, Cromwell and the Independents carried through Parliament an enactment which required all members of that body to resign from civil or military office. Forty days later, April 3, 1645, all of the lords laid down their commissions, and the command of the Parliamentary army was entrusted to Sir This "self-denying" or-Thomas Fairfax. dinance, designed to remove inefficient commanders and give control of the remodeled

army to the Independents, accomplished both objects. Cromwell was made an exception to the new ruling, because of his invaluable service in organizing the new army. See CROM-WELL, OLIVER.

SELF-DETERMINATION OF PEOPLES. See League of Nations; Wilson, Woodrow. SELFISHNESS AND UNSELFISHNESS. See CHARACTER TRAINING (Unselfishness).

SELF-POLLINATION. See Cross-Pol-LINATION; FLOWERS (How the Pollen is Carried).

SELJUKS, sel jooks', the Turkish dynasty with which the nations of Christian Europe came into conflict during the period of the Crusades. The cruel treatment of Christian pilgrims on the part of the Seljuks is described in these volumes under the heading CRUSADES. This dynasty established itself in Syria and Asia Minor in the latter part of the eleventh century, setting up several independent sultanates. The last of these sovereignties endured until the close of the thirteenth century, and out of its ruins the Ottoman Empire rose. It was during the period of Seljuk supremacy that Omar Khayyam (which see) lived. See Turkey (History).

SELKIRK, ALEXANDER (1676-1721), a Scotsman whose experiences as a castaway on a lonely island are said to have inspired the story of Robinson Crusoe (which see). While sailing in the South Sea on a freebooting expedition, he had a quarrel with the captain of the ship and, at his own request, was left upon the island of Juan Fernandez (which see for illustration), about 350 miles west of Valparaiso, Chile (1704). Here he remained in solitude for four years and four months, until rescued by Captain Woodes Rogers of the British navy.

His experiences on the island were recorded in two books of the sea, published in 1712. Selkirk died on board the Weymouth, of which he was at the time lieutenant.

SELKIRK, THOMAS DOUGLAS, fifth Earl of (1771-1820), Scottish philanthropist and colonizer, was born at St. Mary's Isle on the river Dee. The settlement of evicted Highlanders on Prince Edward Island was his first venture. It was soon followed by others in Upper Canada and the Red River Valley, the latter being his outstanding achievement, however. Colonization was begun in 1811, after he had purchased thousands of square miles of land. Pitched and court battles with the North West Company failed to dislodge the immigrants, but cost Selkirk his health and considerable money.

SELKIRK MOUNTAINS, a mountain range in the southeastern part of British Columbia, extending from the United States boundary north to the Columbia River. The range is almost completely encircled by the Columbia River and its tributary, the Kootenay. Though not as lofty as the Rocky Mountains, which are seventy miles east of them, the Selkirks are more Alpine in character, and far more beautiful. The lower slopes, particularly on the west, are heavily wooded. One of the greatest of the countless glaciers of the range is the Illecillewaet, near the Glacier House station of the Canadian Pacific Railway. At Rogers Pass, near this point, the railroad has constructed a five-mile spiral tunnel. Illecillewaet Glacier has its origin in the perpetual snow and ice on the mountains to the south, including Mount Sir Donald (10,645 feet), the highest peak in the range. The Selkirk Mountains have a length of

The Selkirk Mountains have a length of about 200 miles, and a width of about eighty miles. Though usually regarded as a part of the Rocky Mountains system, they belong to an older geological period. Gold was discovered in this section in 1857, and silver, copper, zinc, mercury, coal, and marble have also been found. The Selkirk Mountains were named in honor of Thomas Douglas, Earl of Selkirk.

SELLERS, COLEMAN. See MOVING PICTURES (Romantic Story of Moving Pictures). SELMA, ALA. See ALABAMA (back of map).

SELVAGE. See CLOTH.

SELVAS, extensive woodland plains of the Amazon Valley in South America, covered with the densest vegetation on the globe. They extend from Northern Brazil to Southern Venezuela, and occupy the lowlands, where abundant rains fall most of the year. In the selvas are found rubber, bamboo, rosewood, Brazil-nut, cacao, wax-palm, and many other kinds of trees, with thick tangles of cacti, orchids, and creeping vines. From the selvas Brazil exports rubber and valuable woods. See Brazil.

SEMANTICS, the historical and psychological study of word meanings; the science of meanings, as contrasted to phonetics, the science of sounds.

SEMAPHORE, sem' ah fore. See SIGNAL-ING AND SIGNALS (Marine Signaling).

SEMBRICH, zem' bri K, MARCELLA (1858-1935), an operatic and concert soprano who won high favor with European and American audiences through her charm of personality, dramatic ability, and effective rendition of coloratura passages. As MARCELLINE KOCHANSKA, she was born at Wisniowczyk, Poland. She was educated in music at Vienna, with Wilhelm Stengel as teacher, and he subsequently became her husband. Her first appearance in opera was at Athens, in 1877, when she sang in *I Puritani* with such success that musical critics advised her to prepare for German grand opera. This she did in Berlin, and, from 1878 to 1880, was engaged as one of the leading sopranos in the Dresden court theater.

In 1880 Madame Sembrich made a successful

appearance at Covent Garden, London, as Lucia, and won great applause in the same rôle at the Metropolitan Opera House in New York, in 1883. For several seasons thereafter, she was one of the most popular operatic sopranos on the American stage. Her rôles included the chief so-

prano parts in Hamlet, La Traviata, Barber of Seville, and Rigoletto. In 1909 she retired from the operatic stage, and in 1916 from concert work.

SEMELE, sem' e le, in the Greek myth, a beautiful daughter of Cadmus, king of Thebes. She was wooed and won by Jupiter in the guise of a mortal, but the jealous Juno, taking the form of Semele's nurse, induced her to ask of Jupiter that he



MADAME SEMBRICH

appear before her in his divine glory. First, she extracted from Jupiter a promise to grant to her any favor she might ask, and then she made her request. In vain the king of the gods protested; Semele was firm, and Jupiter at last was obliged to yield to her entreaties. He donned only his mildest glory, but even this was too much for the mortal eyes of Semele, who was burned to death in the blaze of light. Bacchus, her son, was caught up by his father, and saved from destruction.

Related Subjects. The reader is referred in these volumes to the following articles:
Bacchus Cadmus Jupiter Mythology

SEMI-ARID REGION. See ARID REGION. SEMICIRCULAR CANALS. See EAR (The Internal Ear).

SEMICOLON. See Punctuation. SEMILUNAR VALVES. See HEART.

SEMINARY RIDGE. See WAR OF SECES-SION (Principal Battles: Gettysburg).

SEMINOLE INDIANS. See Indians, American (Most Important Tribes).

SEMINOLE WAR. See Monroe, James (Administration: War with the Seminoles).

SEMTRAMIS, se mir' ah mis, a legendary queen of Assyria, whom tradition has made the founder of Babylon and the conqueror of Persia and Egypt. The story relates that she was the daughter of a fish goddess and a Syrian youth, and that, when her mother abandoned her, she was fed by doves. Rescued by the leader of the king's shepherds, she grew to be a beautiful woman, and finally became the wife of King Ninus of Assyria. After her husband's death, she entered upon a spectacular career of conquest, but in the forty-second year of

her reign, she was deposed by her son and disappeared. Herodotus mentions a queen of Babylonia named Semiramis who lived in the eighth century B.C., and the stories of the legendary queen are probably a combination of fact and fable.

SEMI-RELIEF. See Mezzo-Rilievo.

SEMITES, sem' ites, in older classifications, a name applied to one of the three main divisions of the white race, the others being the Hamitic and the Japhetic. The term Semitic comes from Shem, the name of one of the sons of Noah, and the classification mentioned above is based on that given in the tenth chapter of Genesis. Though the Bible classification is inaccurate, the name Semitic has been retained for convenience. In the Semitic group are included the Hebrews (Jews), Assyrians, Chaldeans, Phoenicians, Carthaginians, Arabians, Ethiopians, and various other peoples of similar physical and intellectual traits. It is an interesting fact that the three great religions which acknowledge one supreme deity—Judaism, Christianity, and Mohammedanism—had their origin with Semitic races. It was also from a Semitic people -the Phoenicians-that our alphabet came.

The Semitic Languages are usually divided into northern and southern groups, the former including the ancient dialects of Assyria and Babylonia, and the Hebrew, Phoenician, and Aramaic tongues. Of all of these, Hebrew is practically the only one that has survived as a spoken language. The Assyrian and Babylonian languages have been preserved as literary monuments of the past, by means of the curious wedge-shaped writings known as cuneiform inscriptions. To the southern division belong the Arabic and the Ethiopic languages; the latter survives in the religious literature of Ethiopia and in several dialects. The greatest literary achievements of the Semites are the Bible and the Mohammedan Koran.

Related Subjects. The reader who is interested in this subject is referred to the following articles in these volumes:

Alphabet Jews
Christianity Koran
Cunciform Inscriptions Mohammedanism
Hebrew Language and Literature Races of Men

SEMLIKI, sem' le ke, RIVER. See Albert Nyanza.

SEMLIN, sem leen'. See YUGOSLAVIA (Principal Cities: Belgrade).

SEMMES, semz, RAPHAEL (1809-1877), an American naval officer, commander of the Alabama, the most famous Confederate vessel in the War of Secession. At twenty-three he entered the United States navy, and remained in the service twenty-nine years. A Southerner, he was born in Charles County, Md. Semmes was commissioned commander in the Confederate navy in April, 1861. He commanded the Sumter, which captured seventeen prizes

before it was sold by Semmes, in 1862. During the succeeding two years, Semmes commanded the *Alabama*, which was sunk off Cherbourg by the United States ship *Kearsarge*, on June



Photo: Brown Bro

RAPHAEL SEMMES

19, 1864. Semmes was rescued by an English yacht and landed in England.

He then returned to the Confederate States, and was appointed rear admiral in charge of the James River squadron, which was destroyed during the evacuation of Richmond. Admiral Semmes was commissioned brigadier general, and took charge of the land forces defending Danville, Va. After Lee's surrender and during the reconstruction period,

Semmes practiced law in Mobile, where, late in 1865, he was arrested for treason and imprisoned. He was released in 1868 by President Johnson's third amnesty proclamation.

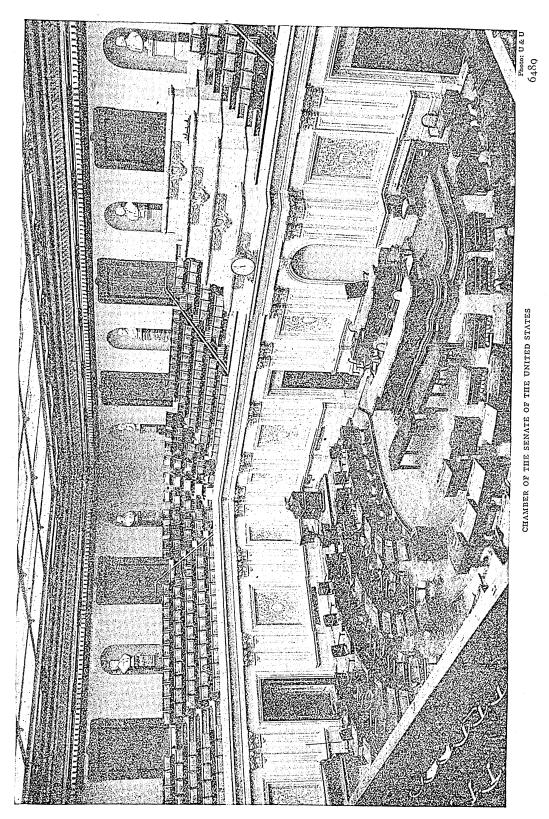
Writings. These include Service Asloat and Ashore During the Mexican War, Campaigns of General Scott in the Valley of Mexico, Cruise of the Alabama and Sumter, and Memoirs of Service Asloat During the War Between the States.

SEMPACH, zem' pahK, Battle of, a decisive battle in Switzerland's struggle for independence. See Switzerland (History); Winkelried, Arnold von.

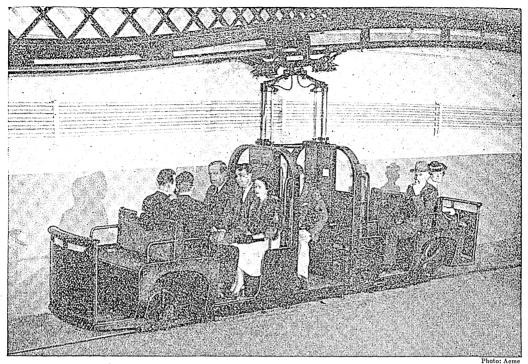
SENATE, the upper and usually smaller branch of the legislature in various countries; for example, the United States and France.

United States Senate. The Senate is the upper chamber in Congress. Its origin is found in the compromise of the Fathers of the Constitution of 1787 who agreed to offset the great preponderance of the large states in the House of Representatives by the creation of an upper chamber in which the small states would have equal representation with the large states. At the same time the Senate was to act as a brake upon the lower house, which represented the people and was expected to be more responsive to popular opinion. Thus the Senate was to be composed of two Senators from each state, chosen by the legislature thereof for six years. The compromise was made most solemnly binding by the constitutional provision limiting the amending process to the effect that no state, without its consent, shall be deprived of its equal suffrage in the Senate.

The spread of democratic sentiment led in 1913 to the Seventeenth Amendment, which ended the indirect election of Senators and



CHAMBER OF THE SENATE OF THE UNITED STATES



UNITED STATES SENATORS POSSESS THEIR OWN RAILROAD

An underground electric railway connects the Capitol and the Senate Office Building, in which each Senator has a suite of rooms. It is therefore possible for Senators to go quickly from their offices to the Senate chamber for a roll call or a vote.

provided for popular election. The change has tended to eliminate some of the plutocrats and agents of capital who sometimes secured their election by the state legislatures. At the same time it has opened the door to demagogues and clever managers of Federal patronage who win supporters by promises of appointments. As to qualifications, the Constitution provides that a Senator must have attained the age of thirty, have been nine years a citizen, and, when elected, be a resident of the state from which chosen.

Organization of the Senate. Unlike the House of Representatives, the Senate is a continuous body. Senators are elected for sixyear terms, but the terms of one third of the Senators expire every two years. Thus it is not necessary to give the oath of office to the entire Senate at the convening of each Congress. Again, the presiding officer in the Senate, namely, the Vice-President of the United States, bears little resemblance to the Speaker of the House. He is not a member of the Senate, and votes only in case of a tie. He does not possess the control over parlia-mentary business which is enjoyed by the Speaker. The Senate has a formal body of rules, but freedom of debate is less limited than in the House, dilatory tactics are more prevalent, and filibustering is frequently used

to obstruct legislation. In 1908, Senator LaFollette alone conducted an eighteen-hour filibuster against an emergency currency bill. Since 1917, the rules provide for a clumsy closure which is sometimes invoked to break a filibuster. See Filibustering.

Committees. Like the House, the Senate employs the committee system. There are thirty-three standing committees, and four or five special committees which vary from time to time. The chief committees are: (1) on finance, which corresponds to the House committee on ways and means; (2) on appropriations; (3) on foreign relations, to which are referred all treaties that are submitted for ratification and all nominations of diplomatic and consular officers; (4) on the judiciary, to which are referred all nominations to Federal judgeships; (5) on interstate commerce; and (6) on banking and currency. These committees are elected by the Senate in much the same manner as committees are elected in the House. The committee on ways and means plays an important role in tariff making, in spite of the constitutional provision that all bills for raising revenue shall originate in the House of Representatives (Article I, Section 7). Under the authority to propose or concur with amendments, the Senate does not hesitate to frame revenue bills which are sometimes substituted

by amendment for the bill from the House. Executive Functions. The Fathers of the Constitution intended the Senate to serve as an advisory council for the President in treaty making and in appointment to office. Accordingly, the ratification of treaties and the appointment of officers require the "advice and consent" of two thirds of the Senators present (Article II, Section 2). President Washington interpreted the Constitution to mean that the President must come into the Senate to discuss the negotiation of treaties. But the Senate objected to this procedure, and from this incident began the practice whereby the President initiates the negotiations and finally submits only the completed treaty to the Senate. Frequently, by refusal to ratify a treaty, as in 1919 when President Wilson submitted the Treaty of Versailles, the Senate has wrecked a presidential foreign policy.

Congress has provided that the larger part of the nearly 700,000 officers of the Federal government shall receive their appointment under civil service regulations. About 17,000 of the more important officers, including all Federal judges and heads of departments, are appointed by the President with the confirmation of the Senate. Because of a long-established custom, called "senatorial courtesy," the Senate will not confirm a nomination by the President which does not receive the approval of the Senators of the state in which the office is located. This compels the President to consult Senators regarding a large number of Federal appointments. Federal patronage is one of the means whereby Senators maintain a following in their home states.

Inequality of Representation in the Senate. The compromise of 1787 whereby every state, great and small, has two representatives in the Senate, has resulted in glaring inequalities. New York with a population of 12,588,066 has no larger voice than Nevada with 91,058; nor Pennsylvania, with 9,631,350, than Delaware with 238,380. The prophecy of Alexander Hamilton that once the Federal government was formed the conflict of interests between the large and small states would disappear, was quickly realized. National controversies have been along other lines, as North against South, or industrial sections against agricultural sections. Thus, while the small states no longer require special protection, the disparity of population today gives undue representation to various areas of the country.

The Roman Senate. The Senate (meaning literally council of elders) of ancient Rome was one of the most famous legislatures in the history of government. Its origin in the eighth century B.C. is assigned to Romulus, who selected 100 heads of families as his councillors. Under the monarchy, the Senate consisted exclusively of patricians; while under the republic, plebeians were admitted. Julius Caesar increased the membership to 900, and Augustus reduced it to 600. At first, the King appointed the Senators, then the consuls; and, later under Sulla, many ex-magistrates automatically became Senators. Senators held office for life. Inasmuch as the elected consuls held office for only one year, while the Senate was a permanent body, its authority gradually increased. Originally its power was limited to governing after the death of a king until the ascension of his successor, and the ratification of the decrees of the comitia or people's assemblies. Before the end of the republic in 27 B. c., the Senate had become the supreme law-making body, with large administrative and judicial powers. Under the empire, Augustus treated the Senate with great respect and shared his powers with it. Under the Julian emperors, it ceased to have any real control of public affairs.

Related Subjects. The reader is referred to: Canada (Dominion Government) Congress of the United States Constitution of the United States (Amendments)

Mace Parliament Reichstag Representatives, House of Vice-President

SENECA, Lucius Annaeus (about 4 B.C.-A.D. 65), a Roman philosopher who taught the doctrine of the Stoics—that virtue is the highest aim in life. He was born in the province of Spain, at Cordova. After studying under the

Stoic philosopher Attalus, he traveled in Greece and Egypt, gained a reputation in the law courts for his eloquence, and rose to the position of quaestor, under the Emperor Claudius. In the year 41, he was banished to Corsica, but eight years later was recalled to Rome by the Empress Agrippina, and made the tutor of her son Nero.



who became the next From a drawing by Raphael. emperor (see Nero).

Though Seneca for a few years exerted a good influence on his wilful pupil, eventually he lost all control over him, and in 65 Nero ordered the philosopher to commit suicide. As a philosophical writer, Seneca is admired not so much for depth of thought as for breadth of view and his sympathetic treatment of moral problems.

His Writings. His extant philosophical writings are moral treatises on such subjects as Consolation, Peace of Mind, and Giving and Receiving Favors. Ten tragedies are also attributed to him. These are not in themselves of great value, but they had an important influence on Renaissance drama.

SENECA INDIANS. See Indians, Ameri CAN (Most Important Tribes).

SENECA LAKE, the largest of the group of lakes in New York, known as the Finger Lakes. It is noted for its beauty, and is a

favorite summer resort. In the vicinity is Watkins Glen State Park, noted for its cascades. The lake is thirty-seven miles long and one to four miles wide; its greatest depth is about 600 feet, and it lies about 450 feet above sea level. It is fed by the waters of Keuka Lake, discharges through the Oswego and Seneca rivers into Lake Ontario, and is connected also by canals with the New York State Barge Canal. It receives its name from the Seneca Indians (see Indians, AMERICAN [Most Important Tribes]), a powerful tribe who inhabited the district in early days.

SENECA RIVER. See SAVANNAH RIVER. SENEGAL, sen' e gawl, a well-advanced French colony in West Africa, between the rivers Senegal and Gambia. Its area is 77,730 square miles. The inhabitants are chiefly Berbers and various Negroid races, numbering altogether about 1,666,000. There is a population of more than 6,000 whites. The natives of four towns—Saint Louis (the capital), Dakar, Rufisque, and Goree—are French citizens; all others are French subjects. The climate is hot and unhealthful for Europeans. There are two seasons, wet and dry; the dry season is fairly healthful, but during the wet months, malaria and other diseases are prevalent. Lions, leopards, cheetas, wild boars, and hyenas are numerous, and crocodiles swarm in the upper portions of the Senegal River. Monkeys abound in the forests, and antelopes and gazelles on the plains. The principal products are coconuts, peanuts, rubber, millet, and maize; there are some native industries, such as weaving, jewelry-making, and the production of bricks and pottery. The principal tree is the baobab. One of the most interesting trees in the world, it often has a circumference of over 100 feet at twenty feet from the ground.

Dakar, the principal port, was a naval base and Vichy (France) administrative center in World War II. In November, 1942, after the invasion of North Africa, Dakar was gained by the Allies, when French West Africa capitulated to the United Nations. See WORLD

WAR II (The War in Africa).

SENEGAL RIVER, a West African waterway which gives its name to the French colony of Senegal (which see), on the Atlantic coast and the southwestern border of the Sahara Desert. The Senegal rises near the sources of the Niger, in the mountains of Futa Jallon, and after a course of nearly 1,000 miles, discharges its waters into the Atlantic Ocean 110 miles north of Cape Verde. The upper course of the river is marked by many rapids, but near the coast the stream becomes deep and sluggish, coasting vessels navigating to a distance of about 460 miles inland.

The river has two notable and picturesque falls, named Guine and Felu, each about fifty feet in height. The basin drained by the Sene-

gal is hot and unhealthful, and the soil is for the most part unfertile, except where it is covered with forest and rank jungle growth. The river does not discharge its waters direct into the sea, but flows into a lagoon which is separated from the sea by a shifting bar of sand, extremely dangerous to shipping.

SENEGAMBIA, sen e gam' bih ah, a name formerly applied to the territory between the rivers Senegal and Gambia, on the west coast of Africa, now known as Senegal (which see).

SENILE DEMENTIA, se' nile de men' shihah. See Insanity.

SENILITY, se nil' ih tie. See DISEASE (Disease in the Human Body).

SENLAC, the real location of the Battle of Hastings. See Harold (II, England); Hastings, Battle of; William (I, England).

SENNA. See CASSIA.

SENNACHERIB, seh nak' ur ib (? -681 B.C.), a king of Assyria, the son of Sargon II, whom he succeeded in 705 B.C. His conquests included Sidon, Ashkelon, and Ekron, and he was successful in suppressing frequently threatening revolt in Babylonia. He also carried on war against Hezekiah, king of Judah. Hezekiah was forced to pay him a heavy tribute, as related in II Kings xVIII, 13-16, though in XIX, 35, it is recorded that the strength of Sennacherib was cut down by the angel of the Lord, and that, as a result, he withdrew his forces. Sennacherib's own records also tell of the siege of Jerusalem. He boasted that he shut up Hezekiah "like a bird in his cage in the midst of his royal city." But he did not indicate that he captured the city.

Because Babylon had so often rebelled, he marched against that famous city and in 689 utterly destroyed it. Soon after this, revolt and intrigue within his own family resulted in his murder. After a brief but bloody interlude

his son Esarhaddon succeeded him.

Parts of an excellent aqueduct built by Sennacherib were found recently. His reputation as a craftsman is unique among kings. W.H.D.

SENSATION. See PERCEPTION.

SENSES, Special. We see, we hear, we taste, we smell, we feel, we experience sensations of heat and cold, hunger and thirst, fatigue, and pain. We are made aware of these sensations through the sensory nerves, which, when properly acted upon, convey impulses to the brain, where they are interpreted. Those senses which bring us knowledge of the world about us-sight, hearing, smell, taste, touch, and temperature—are called special, or exterior, senses, and those that make us aware of our bodily needs are commonly known as general, or interior, sensations. Chief among these are the sensations of hunger, thirst, fatigue, muscle sense, and pain, the last a warning that some organ is failing properly to perform its functions.

The special sensations differ from general sensations in the following particulars:

(1) The nerves of the special senses all end in special organs, as the eye, ear, and nose. The nerves producing general sensations do not.

(2) Special senses tell us of the outside world; the general senses tell us of conditions within the body.

(3) Special senses are more exact; we can locate an object by sight and easily determine the source of

a sound, but we are often at a loss to locate the cause of a pain.

(4) The meaning of each special sensation must be learned by experience, but the ability to interpret the meaning of. general sensations is inherited. The child may not be able to tell a bumblebee from a wasp, but he can distinguish between toothache and stomach ache.

(5) The special senses are important avenues of knowledge, and without them, the mind would never awaken to activity. The general sensations are an aid to health. They tell us when we need food and drink, when we need exercise or rest, and warn us against overindulgence in eating, drinking, and exercising.

Related Subjects. Further information on

SENSITIVE PLANT, BEFORE AND AFTER SHOCK this subject will be found in the following articles:

Brain	Nervous System	Smell
Ear	Nose	Taste
Eye	Reflex Action	Touch
Fatigue	Skin	Vision

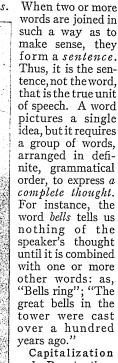
SENSES OF ANIMALS. See ANIMAL (Intelligence and Senses).

SENSITIVE, sen' si tiv, PLANT, a small herb belonging to the same family as the pea, so called because the small leaflets which compose its leaves fold over each other in pairs when the plant is shaken or roughly touched. At the same time, each of the leafstalks bends toward the main stem, as if the plant were shrinking from the intruder. If the plant is then left undisturbed, the leaves will slowly assume their normal position. The sensitive plant is a native of South America, but has been introduced into the United States, where it is sometimes cultivated in greenhouses as a curiosity. The sensitive brier, which grows wild in the Southern states, has the same habit of withering, but does so only when it is very roughly handled.

Scientific Name. The sensitive plant belongs to the family Leguminosae. Its botanical name is Mimosa pudica.

SENSORY NERVES. See Nervous Sys-

SENTENCE, sen' tens.



Capitalization and Punctuation. The first word of a sentence is always capitalized, and

Photo: Visual Education Service

the close of the sentence is indicated by a period, a question mark, or an exclamation point. The punctuation used in the body of the sentence is an important factor in its construction, particularly if it is lengthy, for correct punctuation helps the reader to make a swift mental analysis, and to decide which elements belong together and which do not. See Punctuation.

Parts of a Sentence. The two essential parts of a sentence are the subject and the predicate. The subject, which is always a noun or its equivalent, names the person or thing about which something is said; the predicate embodies what is said about the subject. No matter how long and complicated the subject or the predicate may be, neither one can express a complete thought without the aid of the other.

In the sentence, Bells ring, the noun bells is the complete subject, and the verb ring the complete predicate. In the second sentence quoted above, bells is the simple subject, and its modifiers are the article the, the adjective great, and the prepositional phrase in the tower; were cast is the simple predicate, modified

by the phrase over a hundred years ago.

No matter how long a sentence may be, its structure can always be divided into a complete subject-including one or more nouns, or words used as nouns, and their modifiers; and a complete predicate—one or more verbs and their modifiers. To confusion as to what really constitutes a sentence may be attributed much

of the difficulty experienced by students who habitually use incom-

plete sentences.

Classification of Sentences. As to meaning: According to the form in which the thought is expressed-that is, according to whether it affirms or denies a fact. asks a question, or expresses command, entreaty, or request-a sentence is said to be, respectively, declarative, interrogative, or imperative. Thus, Bells ring is a declarative sentence -the commonest of all sentence forms. Do you hear the bells? is an interrogative sentence. Listen to the bells is an imperative sentence. In the interrogative form, the predicate, either in whole or in part, generally precedes the subject.

grammarians Some include a fourth classification, called the exclamatory sentence, usually introduced by how or what; as, How sweet those bells sound from this distance! This is

really not a separate class, however, as any of the other three forms may be used in an exclamatory way. For example, The bells are sounding the alarm! illustrates the use of a declarative sentence as an exclamation. Similarly, with interrogative and imperative sentences; as, Will you listen to those bells! Hear those

As to structure: With respect to its grammatical structure, a sentence may be simple, compound, complex, or complex-compound. The distinctions are as follows:

A simple sentence is one which, whether long or short, consists of but one subject and one predicate, and makes a single assertion: The bells (subject) are ringing (predicate); The bells of that old village church, cast more than a hundred years ago (subject), still have a most musical chime (predicate).

A compound sentence consists of two or more simple sentences, each of which makes its own complete assertion. Usually, these two or more clauses are joined by a coördinate conjunction, such as and, or, but: Bells are ringing (first clause) AND whistles are blowing (second clause).

A complex sentence consists of one independent clause—that is. a clause that can "stand alone"-and one or more dependent or subordinate clauses: The bells are announcing (independent clause) that the new prohibition law has been passed by Congress (subordinate clause). A sentence may be both complex and compound; as, The bells which you hear are hung in the tower and are

over a hundred years old,

or The bells are ringing

and the whistles are blow-

ing because the longed-

for news has come at last. Order of Subject and Predicate. The usual arrangement is to place the subject and its modifiers first, and the predicate and its modifiers following. When the complete subject precedes the complete predicate, the sentence is said to be in the natural order. If there is any deviation from this arrangement, the sentence is said to be in the inverted or trans-

posed order, as in the examples given below.

The transposed order is particularly common in poetry, where it is used for euphony and rhythm. When employed in ordinary prose, it is with the idea, generally, of adding emphasis and strength by bringing the important word or words into the position of importance—the beginning of the sentence. For example, when we say, A marvelous organizer was Kitchener of Khartum, we construct a far more impressive sentence than if we said, Kitchener of Khartum was a marvelous organizer. Other illustrations of the inverted arrangement are as follows: For five long days the battle raged; Up sprang the Little Colonel; Into each life some rain must

Outline on the Sentence

I. Definition

II. Capitalization and punctuation

III. Parts of a sentence

(a) Subject

(b) Predicate (c) Modifiers

IV. Classification

(a) As to meaning

1. Declarative

2. Interrogative

3. Imperative

4. Exclamatory forms of these classes

(b) As to structure

1. Simple

2. Compound

3. Complex

4. Complex-compound

V. Order of subject and predicate

(a) Natural order

(b) Transposed or inverted order

VI. Sentence analysis

(a) Definition

(b) Importance of process [see ANALYSIS (In Grammar)]

VII. Diagram of a sentence

(a) Definition

(b) Present use of diagraming

(c) Type sentences diagramed VIII. Characteristics of a good sentence

(a) Grammatical correctness

(b) Clearness

(c) Emphasis

(d) Ease and harmony

(e) Unity

fall; Many a backward glance did we cast at the little town, sleeping so quietly in the autumn sunshine. Inverted sentences can readily be thrown into the natural order if it is necessary in order to distinguish the subject and predicate. In the first and third examples listed above, the adverbial modifiers precede the subject. In the second sentence the adverbial modifier and the verb precede the subject. In natural order the sentences read as follows: The battle raged for five long days; The Little Colonel sprang up; Some rain must fall into each life. In the fourth sentence the direct object precedes the subject and the verb. Rearranged the sentence reads We did cast many a backward glance at the little town, sleeping so quietly in the autumn sunshine.

Interrogative sentences and exclamatory sentences are usually inverted. Where did he go? becomes He did go where? How cold the day is!

becomes The day is how cold?

Analyzing the Sentence. Analysis is a term used to describe the process of distinguishing the different parts or elements of a sentence and of classifying each part according to its form and to the work it does in the sentence.

Diagram of a Sentence. The diagram of a sentence is merely a graphic representation of the analysis. It is a picture that shows what work is done by each element, and in what relations the different elements stand to one The practice of diagraming, like another. that of parsing, was formerly used as an end in itself; that is, simply for its own sake, and not for its possible help in understanding the parts of the sentence and their relation to each other. This resulted in almost complete abandonment of the practice in modern educational method. Efforts are being made now, however, to introduce it again for its real purposesthose of providing a graphic illustration of sentence parts and their relation, and of displaying this relationship all at once, so that the student may see the sentence as a whole.

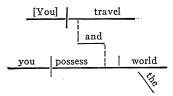
The following type sentences are diagramed according to the method which was widely adopted as being both simple to construct and easy to grasp. The student will find it profitable to practice the diagraming of other sentences, using these forms as models.

SIMPLE SENTENCE: Travel is a great educator.

Explanation: The principal parts of the sentence—simple subject and simple predicate—are written on the heavy line, which is cut at right angles to mark the division between the two parts. On the lighter slanting lines are written the less important parts of the sentence—the modifiers. The short, oblique line separating is and educator indicates

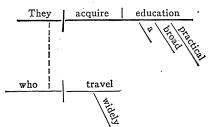
that the noun is the complement of the verb; if it cut the main line at right angles, it would indicate the object of the verb (see next diagram).

COMPOUND SENTENCE: Travel, and you possess the world.



Explanation: Since the independent clauses which make up any compound sentence are of equal rank, each one is indicated by a heavy line. The direct object world is separated from its verb by a short line drawn at right angles to the main line. Only transitive verbs, of course, can take an object in this manner.

COMPLEX SENTENCE: They who travel widely acquire a broad practical education.



Explanation: The independent clause is shown on the heavy line, the subordinate clause on the lighter line. The dotted line indicates that who not only serves as the subject of the subordinate clause, but forms the connecting word between the two clauses.

Characteristics of a Good Sentence. There are five principal points of excellence which a sentence must possess to qualify as truly good English. First, it must be grammatically and idiomatically correct. Second, it must make its meaning absolutely clear. It must be forceful and emphatic. It must make smooth, easy, and euphonious speech or reading, without annoying repetitions or grating sound combinations. And, finally, it must have unity, presenting one thought completely, instead of being a jumble of unrelated ideas loosely bound by conjunctions.

Common Errors. The principal errors that mar the sentences of our everyday speech have been discussed very fully in the articles on the parts of speech and other grammar topics. See list under GRAMMAR.

E.E.H.

SEOUL, se ool'. See Chosen (old Korea).

SEPAL. See FLOWER.

SEPARATE SCHOOLS. See CANADA (Education).

SEPARATISTS. See PILGRIMS; PLYMOUTH COLONY; CONGREGATIONAL CHURCH; COLONIAL LIFE IN AMERICA.

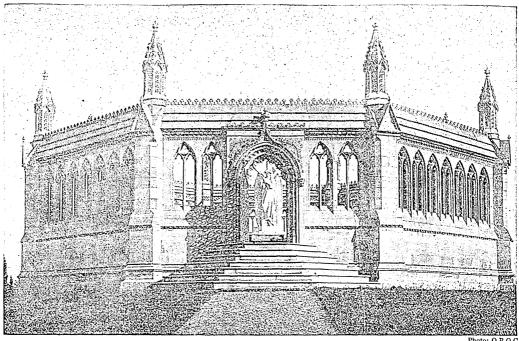


Photo: OROC

MEMORIAL AT CAWNPORE

The marble building encloses a well where, on July 15, 1857, during the Sepoy Rebellion, many women and children were massacred.

SEPIA, a dark-brown pigment prepared from the secretion found in the ink bags of certain species of cuttlefish (which see). As soon as a fish is captured, its ink sac is removed, and the dark fluid is dried at once to prevent decay. The secretion, in the form of powder, is next treated with caustic alkali and acids, washed, and dried. The resulting dark-brown sepia is used to a limited extent in the preparation of water colors and drawing ink.

SEPIOLITE, se' pih o lite. See MEER-SCHAUM.

SEPOY, se' poi. See SEPOY REBELLION, subhead.

SEPOY REBELLION, a mutiny of native troops in India, beginning in May, 1857, and followed in 1858 by the transfer of the government of India to the British sovereign. In its effects, it may be regarded as the most important episode in the history of British India. The underlying cause was discontent because of the introduction of Western ideas, and the disregard of the English for native customs and religious beliefs. The climax came when the English ordered the Sepoys, as the native troops are called, to use greased cartridges. The Hindus had religious scruples about tasting anything prepared from the meat of a cow or pig, and, consequently, about biting the end patches from the cartridges, but these ideas were held in contempt by the British officers, who acted for the East India Company.

On May 10, 1857, the native troops at Meerut, a town near Delhi, rose in frenzied revolt, freed from prison their countrymen who had refused to use rifles loaded with the obnoxious cartridges, and massacred the Europeans; they next seized Delhi. The revolt spread and was encouraged by Nana Sahib, who caused a massacre of men, women, and children at Cawnpore. Lucknow, after a long siege, was temporarily relieved by Sir Henry Havelock, and finally saved by Sir Colin Campbell. revolt was practically crushed by June, 1858, though Oudh was not completely reduced until the beginning of 1859. A stately memorial has been erected to the Cawnpore victims.

The mutiny convinced the East India Company that it could no longer control the situation, and after the rebellion was crushed, the administration of Indian affairs was given over to the British government, the ruler of Great Britain becoming sovereign also of India.

Sepoy, from the Hindu word sipahi, meaning a soldier, is the term applied to a private soldier in the native infantry of the Indian army. The Sepoys in the Indian service are a very valuable addition to the English forces, as they are courageous, temperate, and indefatigable fighters.

Related Subjects. In connection with this discussion of the Sepoy Rebellion, the following articles in these volumes may be referred to:

East India Company India (History: A Great Crisis)

Lucknow Nana Sahib Outram, Sir James

SEPTEMBER CALENDAR

Birthdays

1.3

- Peter Cartwright, 1785.
 James Gordon Bennett, 1795.
 Henry George, 1839.
 Eugene Field, 1850.
 Sarah Orne Jewett, 1849.
 Pindar, 522 B. C.
 Phoebe Cary, 1824.
 Marquis de Lafayette, 1757.
 Horatio Greenough, 1805.
 Sir Georges E. Cartier, 1814.
 Jane Addams, 1860.
 Queen Elizabeth, 1533.
 Richard I of England, 1157.
 Thomas Hutchinson, 1711.
 Cardinal Richelleu, 1585.
 John Ireland, 1838.
 Charles Dudley Warner, 1829.
 John J. Pershing, 1860.

- 14. Charles Dana Gibson, 1867.
 15. James Fenimore Cooper, 1789.
 William Howard Taft, 1857.
 16. Francis Parkman, 1823.
 18. Samuel Johnson, 1709.
 19. William B. Astor, 1792.
 Louis Kossuth, 1802.
 20. Mungo Park, 1771.
 21. Louis Joliet, 1645.
 Clark Howell, 1863.
 22. Earl of Chesterfield, 1694.
 23. Augustus Caesar, 63 B. C.
 24. John Marshall, 1755.
 25. Felicia D. Hemans, 1793.
 27. Samuel Adams, 1722.
 29. Robert Clive, 1725.
 Admiral Nelson, 1758.
 30. Pompey, 106 B. C.

Events

- Events

 1. Aaron Burr acquitted, 1807.
 Bulgaria declared war on Rumania, 1916.
 Beginning of Japanese earthquake which killed 192,000 people, 1923.

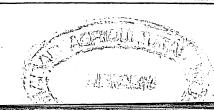
 2. Battle of Actium, 31 B.C.
 Treasury Department of United States organized, 1789.
 Russians captured Lemberg, 1914.
 3. Treaty of Paris signed by United States and Great Britain, 1783.
 Dirigible airship Shenandoah destroyed, 1918.
 4. Third Republic declared in France, 1870.
 5. First Continental Congress met in Carpenters' Hall, Philadelphia, 1774.
 6. Pilgrims left Plymouth in the Mayshower, 1620.
 President McKinley shot by assassin, 1901.
 Peary's discovery of North Pole announced, 1909.
 First Battle of the Marne begun, 1914.
 6. German retreat from the Marne, 1914.
 6. New Amsterdam surrendered by the Dutch to the English, 1664.
 6. English gained possession of Montreal, 1760.
 6. Tornado at Galveston, Tex., 1900.
 6. California admitted to the Union, 1850.
 6. About 5,000 Acadians banished, 1755.
 Battle of Lake Erie, 1813.
 6. President Kruger abandoned the Transvaal, 1900.
 7. Battle of the Aisne begun, 1914.
 7. Russians burned Moscow, 1812.
 8. Russians began steps of Przemysl, 1914.
 8. Siege of Paris begun, 1870.
 9. President Garfield died, 1881.
 9. Russians began siege of Przemysl, 1914.
 9. Siege of Paris begun, 1870.
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 9. President Garfield died, 1881.
 9. Russians began siege of Przemysl, 1914.
 9. Siege of Paris begun, 1870.
 9. S

For Study

Baltimore Oriole Bulbs Corn Cotton

Equinox Fog Forests and Forestry Goldenrod Gourd

Mushroom Potato Roots Seeds Sunflower Wheat



SEPTEMBER QUOTATIONS

O sweet September! thy first breezes bring The dry leaf's rustle and the squirrel's laughter, The cool, fresh air, whence health and vigor spring,

And promise of exceeding joy hereafter.

- 2. That which is unjust can really profit no one; that which is just can really harm no one.

 —Henry George.
- A cheerful temper joined with innocence will make beauty attractive, knowledge delightful, and wit good-natured.
 — Addison.
- 4. You may wear your virtues as a crown,
 As you walk through life serencly,
 And grace your simple rustic gown
 With a beauty more than queenly.

 Phoebe Cary.
- 5. From dewy lanes at morning The grapes' sweet odors rise. At noon the roads all flutter With golden butterflies.

-Jackson.

6. By all these lovely tokens September days are here, With summer's best of weather And autumn's best of cheer.

-Jackson.

- 'Tis education forms the common mind; Just as the twig is bent the tree's inclined.
- 8. A merry heart goes all the day,
 Your sad tires in a mile-a. —Shakespeare.
- To act the part of a true friend requires more conscientious feeling than to fill with credit and complacency any other station or ca-pacity in social life.
- 10. Kind hearts are more than coronets, And simple faith than Norman blood Tennyson.

II. O sweet September rain!
I hear it fall upon the garden beds,
Freshening the blossoms which begin to wane.
—Collins.

- 13. Be not the first by whom the new are tried; Nor yet the last to lay the old aside. Pope.
- 14. A merry heart doeth good like a medicine.
- 15. Life is to be fortified by many friendships
- 16. Yes! in the poor man's garden grow, Far more than herbs or flowers, -Kind thoughts, contentment, peace of mind, And joy for weary hours. -Howitt.

There was a jolly miller once, Lived on the River Dee; He worked and sang, from morn to night;
No lark so blithe as he.
And this the burden of his song
Forever used to be—
"I care for nobody, not I,
If no one cares for me."

Bicker.

- Bickerstaff.

Happy the man, of mortals happiest he, Whose quiet mind from vain desires is free; Whom neither hopes deceive, nor fears torment, But lives at peace, within himself content.

- 17. The morrow was a bright September morn;
 The earth was beautiful as if newborn;
 There was that nameless splendor everywhere,
 That wild exhilaration in the air,
 Which makes the passers in the city street
 Congratulate each other as they meet. Longfellow.
- 18. Example is always more efficacious than precept. —Samuel Johnson.
- 19. The true purpose of education is to develop, to their fullest extent, the capacities of every kind with which the God who made us has endowed us.
- 20. The noblest mind the best contentment has.
- 21. The only way to have a friend is to be one.

 -- Emerson.
- Through the long night the surges roared In hoarse, wild rage, against the rocks Whose flinty horns their white sides gored—Then came the Equinox.—Blake.
- The pollen-dusted bees
 Search for the honey-lees
 That linger in the last flowers of September;
 While plaintive mourning doves
 Coo sadly to their loves 23.
 - Of the dead summer they so well remember. -Arnold.
- 24. True friendship is a plant of slow growth, and must undergo and withstand the shocks of adversity before it is entitled to the appella-tion. Washington.
- 25. Ay, call it holy ground, The soil where first they trod: They have left unstained what there they found— Freedom to worship God.
- To the contented, even poverty is joy.

 To the discontented, even wealth is a vexation.

 —From the Chinese.
- 28. Now hath the summer reached her golden close, And lost, amid her cornfields, bright of soul, Scarcely perceives from her divine repose How near, how swift, the inevitable goal. Lampman.
- 29. Education commences at the mother's knee, and every word spoken within the hearsay of little children tends towards the formation of character. Ballou.
- 30. And soon, too soon, around the cumbered eaves Shy frosts shall take the creepers by surprise, And through the wind-touched reddening woods shall rise October with the rain of ruined leaves.

What visionary tints the year puts on, When falling leaves falter through motionless

-Lambman.

Or numbly cling and shiver to be gone!
How shimmer the low flats and pastures bare,
As with her nectar Hebe Autumn fills The bowl between me and those distant hills, And smiles and shakes abroad her misty, tremulous hair,

—Lowell.



EPTEMBER. A Canadian poet, Archibald Lampman, gives in his September a beautiful picture of the month in his northern homeland:

In far-off russet cornfields, where the dry Grey shocks stand peaked and withering, half concealed

In the rough earth, the orange pumpkins lie, Full-ribbed; and in the windless pasture-field The sleek red horses o'er the sun-warmed ground Stand pensively about in companies, While all around them from the motionless trees, The long clean shadows sleep without a sound.

This month, the transition period between summer and autumn, partakes of the character of both seasons. In the southern part of the United States, it is one of the warmest months, and even farther north, hot days are not infrequent; but nights are likely to be cool, and there is often more than a touch of that golden haze which makes the later autumn days so heautiful

It is a busy month in rural sections, for it is the harvest period for many crops, and while the "tilled earth . . . naked and yellow from the harvest lies," the "tanned farmers labor without slack," to store away the rich fruits of the fields. In the calendar of Charlemagne, September was called the "harvest month," and it still bears that name in Switzerland. The Anglo-Saxons were more specific in their choice of a name, and called September the "barley month."

History of the Month. The old rhyme declares that—

Thirty days hath September, April, June, and November.

Many of the months have undergone changes in their number of days, but September has always had thirty days since old Roman times. It has not always been, however, as it is today, the ninth month. Before the calendar was revised by Julius Caesar, it was the seventh month, and its name is from the Latin septem, meaning seven; when the month was shifted, in the Julian calendar, to the ninth place in the year, its name was not changed.

The only holiday that falls in September is Labor Day, which, in the Canadian provinces and in most of the states of the American Union, is the first Monday in the month. See Labor Day; and pages 6497-6498.

SEPTICEMIA, sep tih se' mih ah. See Bloop (Blood Poisoning).

SEPTIC TANK. See SEWAGE AND SEWER-

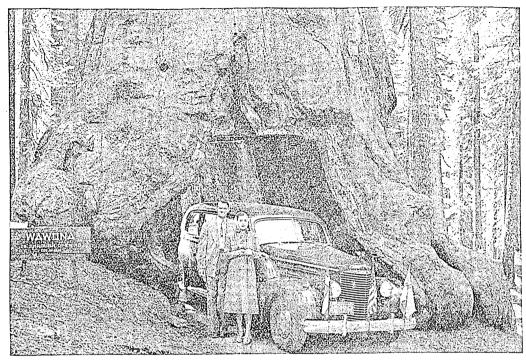
SEPTIME, sep' teem, a term in fencing (which see).

SEPTUAGINT, sep' tu a jint, the oldest Greek translation of the Old Testament. It is supposed that it was begun in the third century B.C., in Alexandria, Egypt. It was completed before the Christian Era, and had an important influence in the preparation of the world for Christianity, as well as in spreading it in the period of the early Church. Its oldest existing manuscripts, the Vatican and the Sinaitic copies, are still much used by scholars in the comparison of texts. The name, meaning according to the seventy, refers to an early belief, founded on a forgery, that the translation was made in seventy-two days by seventy-two scholars, brought by Ptolemy Philadelphus from Jerusalem. It is commonly indicated by the Roman numerals LXX. See BIBLE (From One Language to Many).

SEPTUM. See Nose. SEQUOIA, se kwoi' ah. On the Pacific coast of the United States are found the oldest living things on earth. These are the lordly trees of the cone-bearing Sequoia genus, the patriarchs of the plant world. There are two species—the so-called big trees, or giant sequoias, and the redwoods, or evergreen sequoias. Both species have been successfully introduced into European gardens by the planting of seedlings, but only in Western America may these trees be seen in their majestic size and

great age.

Big Trees. According to David Starr Jordan, the largest specimens of the big trees may be seventy centuries old. Some of these aged monarchs of the forest were mature plants when the pyramids of Egypt were being built. A tree of average size, twenty-three feet in diameter, was felled, and its annual rings were counted; it was found to be about 2,125 years old. The descriptions of the largest specimens, most of which have been given special names, seem unbelievable to one who has never seen a big tree. "General Sherman" (see illustration, under California) has so huge a girth that it requires twenty men to encircle its trunk; the "Keystone State" is 325 feet in



WAWONA TREE IN YOSEMITE NATIONAL PARK

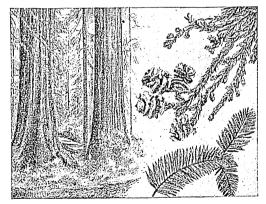
Nearly all the great trees in Yosemite are named. The one whose lower trunk is shown above has a diameter of 26 feet, and is 227 feet high. The cut in this tree, to permit passage of vehicles along the main highway, was made in 1881. Standing beside the car, which has just come through the Wawona Tree, is Crown Prince Frederick and Crown Princess Ingrid of Denmark and Iceland.

height; and the "Empire State" is ninety-four feet in circumference. The "Grizzly Giant," so-called because of its battered appearance, has several branches each of which is six feet in diameter. Through the hollowed trunks of some of the fallen trees, two men may ride abreast on horseback, and another specimen, standing square across a roadway, has been cut through at the base and transformed into an archway, through which large motorbuses can easily be driven. A dancing pavilion has been made by polishing the surface of the stump of one gigantic specimen, doubtless the only ballroom of its kind in the world. One traveler in the West tells of a tree having a great hollow burnt in it—probably the work of Indiansand in the space the six ponies and mules of the company were stabled. Yet so great was its vitality that, far above the onlooker, its foliage showed green and fresh against the sky.

The big trees, which are found only on the western slopes of the Sierra Nevada range, grow at altitudes of from 5,000 to 7,000 feet, and occur in scattered groves in the central part of California. One of the finest and best-known groves, the Mariposa, is now a part of Yosemite National Park (which see). Other well-known groves are the Calaveras, Stanislaus, Fresno, Merced, and Tuolumne. Over

a million giant trees, having General Sherman as their chief, are contained in Sequoia National Park (see Parks, National).

The trunks are very large at the base, and gradually taper; the branches begin to appear about half or two-thirds of the distance to the



THE SEQUOIA

top. The soft, coarse-grained wood is red in the center, but that containing the sap is white. So durable is the wood that it resists decay for centuries, even when buried in leaf mold. Miners in California found well-preserved trunks at a depth of more than 2,500 feet below the crest of a mountain ridge. Often an old tree is covered with rough, grooved bark two feet thick, but twelve inches may be considered an average figure. The bark is cinnamon-red on old trees, and reddish-purple on young specimens, and the feather-like leaves resemble those of the pine. The fruit is a small, oval cone containing seeds so small one can hardly believe that from them could grow such mighty trees.

It is a picturesque Indian belief that the big trees alone among the children of the forest were specially created by the Great Spirit. All other trees, they say, grew like other plants. The genus was named in honor of Sequoyah (which see), a half-caste Cherokee Indian who invented an alphabet for his tribe. In the words of John Muir—"The big tree is Nature's masterpiece. As far as man is concerned, it is the same yesterday, to-day, and forever—emblem of permanence."

Redwood. Like the giant sequoias, the redwoods have tall, straight trunks bare of branches for a considerable distance from the base. They are also numbered among the



A church at Santa Rosa, California, built entirely from the wood of one great redwood tree.

forest giants, for the large trees are fifteen feet in diameter and 300 feet high, with occasional specimens somewhat taller. These trees are found on the Pacific side of the Coast Range, in California and Southern Oregon, and are the most valuable timber trees west of the Rocky Mountains. The light, durable wood takes a beautiful satiny finish, and is used extensively for woodwork in houses. It is also valued for building lumber, paving blocks, railroad ties, and poles. Fancy furniture and bric-a-brac are made from curly-grained redwood. The redwoods are being felled at a faster rate than the big trees because they grow lower on the slopes and are more accessible, and because many of the giant sequoia groves are in reservations or on private estates and are protected. The woodmen, too, feel that there is less danger from forest depletion, because the redwoods send up suckers from the stumps, and the big trees do not.

The redwoods differ from most conifers in being able to grow again from stump-sprouts, and thus are less apt to be destroyed by fire. Several of the great lumber companies of the West are managing their properties in such a way as to perpetuate the great redwood forests.

G.M.S.

Scientific Names. The Sequoia genus belongs to the family Pinaceae. The big trees are known as Sequoia gigantea (S. washingtoniana in some classifications). The redwoods are S. sempervirens.

SEQUOIA NATIONAL PARK. See Parks, National; Sequoia.

SEQUOYAH (1770-1845), a Cherokee Indian, leader in the affairs of his tribe and inventor of the Cherokee alphabet. In 1917 a bronze statue of him, the work of Vinnie Ream Hoxie, was the first contribution of the state of Oklahoma to Statuary Hall, Washington, D. C. He was born in Georgia, the son of a full-blooded Cherokee woman and a German trader named George Gist, who abandoned his squaw shortly after the birth of their child.

Sequoyah's English name was George Guess, a corruption of "Gist," and the word "Sequoyah" means "guessed it." Sequoyah grew up among the Cherokees in Georgia. Immediately after his invention of the Cherokee alphabet, in 1821, not only were newspapers published in the Indian language which could be read by all, but the New Testament, hymns, tracts, and books of various kinds were likewise issued. Sequoyah went to Washington, D. C., in 1828, as one of the representatives of the Western tribes; at this time, his invention was recognized by Congress. Five years before, he had moved from Georgia with other members of the Cherokee tribe, at first to the Territory of Arkansas, and later to the Indian Territory, now a part of Oklahoma. See Statuary Hall.

SERAGLIO, se ral' yo, from the Persian serai, meaning old palace, is the name given to the ancient residence of the Turkish sultan at Constantinople. The old building is beautifully situated on a point of land projecting into the sea. Its walls, which embrace a circuit of about nine miles, enclosed a variety of mosques, the museum of Constantinople, the harem, and large buildings capable of accommodating 20,000 people. As the palace has not been occupied by the sultan since 1839, it has fallen into ruin. The word seraglio is now restricted to mean a harem, or suite of women's apartments.

SERAJEVO, seh rah' yay vo, officially Sara-JEVO. See BOSNIA AND HERZEGOVINA; YUGO-SLAVIA (Principal Cities); WORLD WAR I.

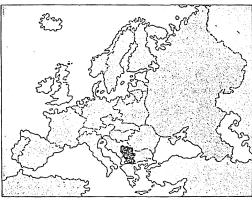
SERAPEUM, sehr ah pe' um. See SERAPIS (mythology).

SERAPHIM, sehr' ah fim. See CHERUB.

SERAPIS, se ra' pis, a name compounded of Osiris and Apis, and employed in Egyptian mythology to denote a deity who was never recognized by the true Egyptians, but was much worshiped in the Greek and Roman towns in Egypt. The great statue of Serapis, doubtless originally a statue of Jupiter, was kept at Memphis in a beautiful temple called the Serapeum, which was visited by pilgrims from all parts of Egypt because of its special holiness.

SERAPIS. See Jones, John Paul.

SERBIA, formerly an independent kingdom situated in the northwestern corner of the Balkan Peninsula, but since World War I the largest section of the State of the South Slavs, called Yugoslavia. This is a new kingdom that had its origin in the disintegration of old Austria-Hungary. The Serbian territory extends from the Save-Danube line on the



LOCATION MAP

This former kingdom of Southern Europe, through the crime of a fanatic in 1914, furnished the direct cause needed to fan smoldering fire into a consuming flame of war.

north to Greece on the south, and from Albania, Montenegro, and Bosnia on the west to

Rumania and Bulgaria on the east.

The People. The Serbians are a branch of the great Slavic group of peoples, who include the Russians, Poles, and Bohemians, but more particularly they represent the South Slav group, whose burning desire to be free from Austrian rule was one of the main causes of World War I. Serbs are not only found in Serbia, but are numerous in the adjoining provinces of Yugoslavia. The language spoken by these people is Serbo-Croatian, but the Croatians are chiefly Roman Catholics, and the Serbs are largely of the Greek Orthodox faith. The name Servia for the country, and that of Servians for the people, which were once in general use in historical writings, are not only incorrect, but are objectionable to the Serbians, for they suggest the Latin word servus, which means slave.

Area and Population. Serbia began its history as a free and independent nation in 1878. It then covered most of the territory now included in North Serbia. In 1913, at the end of the second Balkan War, its area of 18,650 square miles was increased to 33,891 square miles. When the new kingdom of Yugoslavia was established, and its external and internal boundaries were defined, the commission awarded Serbia most of the Turkish territory that had been assigned to Montenegro in 1913, besides a section of Bulgarian land along the eastern frontier. The population was about 4,130,000. When Yugoslavia was divided into nine provinces in 1929, the boundaries of Serbia were lost. Belgrade, the old capital of the Serbian kingdom, is the present capital of Yugoslavia.

For physical features and products, see the

article Yugoslavia.

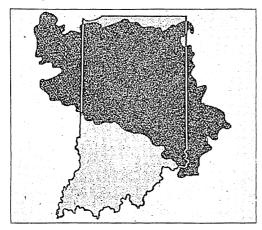
History. In ancient times, Serbia formed a part of the Roman province of Moesia. At the time of the invasion of the barbarians, it was occupied in succession by Huns, Ostrogoths, Lombards, and Avars. At the invitation of the Byzantine emperors of Constantinople, the Serbs settled in this region during the seventh century. In the eleventh century, the Serbs threw off their allegiance to the Byzantine emperors and established an independent king-This Serb kingdom extended its territory, and in the middle of the fourteenth century, it occupied a great part of the Balkan Peninsula and included, besides the present kingdom of Serbia, Montenegro, Bosnia, Albania, part of Bulgaria, and the northern part of Greece.

Then the Turks invaded the country, and in the Battle of Kossovo (1389), defeated the Serbians so completely that Serbia remained a part of the Ottoman Empire for over 400 years. Not until 1878, after many heartbreaking struggles and the loss of thousands of its brave fighters, did Serbia take its place among the nations as a kingdom wholly freed from Turkish rule. This result followed the Russo-Turkish War of 1877-1878, in which Turkey was badly defeated. The peace treaty acknowledging Serbia's independence was dictated by the Great Powers (see Berlin, Congress of).

A new era for Serbia began in 1903 with the accession to the throne of Peter I, the son-in-law of Nicholas of Montenegro. He was devoted to his country, and proved himself to be a progressive, constitutional ruler. Under the inspiration of his personality, the Serbs, both in and out of Serbia proper, dreamed of a Greater Serbia that would be the homeland of those South Slavs who found the yoke of the Dual Monarchy most galling. A step toward this goal was the formation of the Balkan Alliance in 1912, when Serbia, Montenegro, Bulgaria, and Greece began a war against Turkey for the liberation of the oppressed

Christians in Albania and Macedonia. This struggle ended in the complete defeat of Turkey, but a month after the signing of the peace treaty, which occurred on May 30, 1913, hostilities were resumed by the Bulgarians, who were dissatisfied with the distribution of the conquered Turkish territory.

This second Balkan War, in which Bulgaria was defeated by its former allies, had serious consequences. The cession to Serbia of a large



COMPARATIVE AREAS

Serbia, as it existed to 1918, was not quite as large as the state of Indiana.

portion of Macedonia at the expense of Bulgaria excited the jealousy of Austria-Hungary, and left a smoldering flame of resentment in Bulgaria that placed this country on the side of the Central Powers in World War I. Events moved quickly toward the world catastrophe. The aged King Peter, broken in health, had appointed his son Alexander regent of the kingdom, on June 24, 1914. On June 28, in the Bosnian capital of Sarajevo, Archduke Francis Ferdinand, heir to the throne of Austria-Hungary, was assassinated by Serb fanatics who hoped to further, by such means, the realization of their ideal of a Greater Serbia. There was no proof that the Serbian government had connived at this murder, but Austria professed to believe that the act was part of a general Serbian plot to dismember the Dual Monarchy. Accordingly, the Austro-Hungarian government made demands upon Serbia that it was impossible to meet without a yielding of sovereign rights, and, on July 28, declared war on the smaller nation (see WORLD WAR I, for further details).

The Austrian army invaded Serbia immediately, but without much success. The major campaign against that country began in the fall of 1915, when Bulgaria entered the war as an ally of Germany and Austria. Belgrade was occupied on October 9, and as a result of a powerful drive by the combined German,

Austrian, and Bulgarian forces, the whole of Serbia was occupied by the enemy by the close of 1915. King Peter and Prince Alexander accompanied the Serbian troops in the dreadful retreat across Albania, the old king being carried on a litter. The Serbian Cabinet took refuge in Corfu, a Greek island in the Ionian Sea.

The king lived in retirement until his death, in 1921, but the young regent kept in touch with the Allies throughout the war, and in London, in April, 1916, publicly expressed his expectation of seeing a united state of the Yugoslav peoples arise from allied victory. Prince Alexander became regent of new Yugoslavia on December 1, 1918, and in November, 1921, he took the oath to support the Constitution as King Alexander I [see Yugoslavia (History and Government)].

Related Subjects. In addition to the references given above, the reader is referred in these volumes to the following articles:

Alexander I Austria-Hungary Balkan Peninsula

6503

Balkan Wars Montenegro Russo-Turkish Wars

SERBO-CROATIAN, kro a' shun, LAN-GUAGE. See LANGUAGES OF THE WORLD; SERBIA; YUGOSLAVIA.

SERBS, CROATS, kro' ats, AND SLO-VENES, slo veenz', KINGDOM OF THE. See YUGOSLAVIA.

SERENITY, se ren' it ie. See LIFE Ex-TENSION.

SERFS, laborers under the feudal system in Europe, who were bound by law to the land on which they lived, being transferred with it from one owner to another. The serf system of labor arose in the disorderly period of the early Middle Ages, when, in return for protection from raiders, the peasants cultivated the land of the lords and paid the latter dues on houses, cattle, etc. Serfs were a higher order than slaves and lower than villeins, who were free to go from one lord to another if they chose. Most of the slaves eventually rose to serfdom, and many serfs were able to obtain the freedom of the villein. Both serfs and villeins, however, suffered deep misery from their degraded position, excessive taxation, and deprivation of educational and religious advantages. By the nobility and clergy, they were considered as less than the cattle or the game on their estates.

The system disappeared gradually, with other institutions of feudalism, in the later Middle Ages, but its spirit survived far into the modern period, till the people themselves arose, from time to time, and wrested their rights from those by whom they were oppressed.

Serfdom in Russia was the result, not of feudalism, but of the despotism of the government. It was abolished in 1861, when millions of serfs of the Crown were freed by decree of Alexander II. See Feudal System.

SERGEANT, sahr' jent, a noncommissioned officer in an army, next in rank above a corporal. A sergeant in the United States Army has from twenty-four to thirty-six men under him, and receives base pay of \$60 a month plus quarters. He preserves discipline and teaches drills. Various specialized tasks may be performed by staff sergeants, who receive \$72 monthly; technical sergeants, getting \$84; and master sergeants, \$126. A master sergeant may act as regimental sergeant major, the highest noncommissioned rank, serving as a sort of chief clerk for the regiment. See Army.

SERGEANT-AT-ARMS, an officer appointed by a legislative body to enforce order at its meetings, to serve processes ordered by the assembly, and to make arrests of members during the session, when their presence is necessary to constitute a quorum. The sergeant-at-arms in each branch of the Congress of the United States is an important officer, and his authority cannot be ignored. the sergeant-at-arms carries the mace (which see) down the aisle of either house, all disorder should cease. Anyone continuing in disorder after this demonstration is guilty of contempt. The sergeant-at-arms of the House of Representatives also has charge of the pay roll of the members.

The office is said to have been created in the latter half of the twelfth century by Richard I of England, who appointed a corps of twenty-four members to attend him and guard his person.

In Canada and England. In the Canadian Parliament, the sergeant-at-arms of the House of Commons has charge of messengers and pages, looks after the furniture of the House and offices, arrests offenders against the privileges of the House, and carries the mace before the Speaker on official occasions, during sessions of Parliament.

In Great Britain, such officers are appointed to attend the Speaker in the House of Commons and the Lord Chancellor in the House of Lords. The duties of sergeant-at-arms are also exercised by any of the eight members of the royal household who have charge of the ceremonies at public functions.

SERIES MOTOR. See ELECTRIC MOTOR (Types of Motors).

SERINAGUR, se re' nuh gur, a variant of Srinagar. See India (The Cities).

SEROUS, se' rus, MEMBRANES. See MEMBRANES (Serous Membranes).

SERPENT. See SNAKE.

SERPENTINE, sur' pen tine, a variety of rock composed of silica, magnesia, and water. It is not a primary rock, but is derived from the metamorphism of such basic rocks as peridotite. It ranges in color from various shades of green to brown, yellow, and red. Most varieties are green, spotted, or streaked with black and white. Serpentine is strong, easily quarried, takes a beautiful polish, and

is a valuable stone for interior finish. When used outside, it is likely to bleach and become an unpleasing pale-green tone, or to become streaked with iron rust from the decomposition of the iron minerals. In some localities in the United States, green serpentine is known as verd antique marble, though it is not marble. The name serpentine was given this rock because of its green-mottled surface, which resembles in a slight degree the skins of serpents. Asbestos (which see) is a fibrous variety of serpentine.

SERRA, selir' rah, Father Junipero. See California [History (Old Missions)].

SERRA DO MAR, sehr' rah doh mahr. See Brazil (Highlands and Lowlands).

SERTORIUS, sur toh' rih us. See Pompey (Early Service to the State).

SERUM, se' rum, ALBUMEN, the albumen

in the blood. See ALBUMEN.

SERUM THERAPY, thehr' ah pih, a method of combating disease by means of serums. Serum is the fluid portion of the blood, but in the special sense in which the term is used in medical practice, a serum is a fluid compound derived from blood, and used in the treatment Serums act by neutralizing the of disease. poisonous products (toxins) of disease germs, or by killing the bacteria themselves. Those of the first class are said to be antitoxic; those of the second type are anti-bacterial. nature fights disease in the body by developing antibodies in the blood, man is assisting nature when he prepares serums that have the same effects as the natural antibodies. The introduction of serum into a person already diseased is an example of curative serum therapy; when a well person is inoculated, in order to escape possible infection, he is undergoing preventive inoculation.

Antitoxic serums are prepared as follows: The organisms of the particular disease to be controlled are grown in a fluid medium, and a filtrate is obtained by passing the fluid through a porcelain filter. This filtrate contains the toxins, or poison products, of the germs. It is injected beneath the skin of a large animal, such as a horse, through a series of inoculations, each dose being stronger than the preceding The animal accumulates, gradually, large amounts of antitoxins, or antibodies, in its blood, in order to resist the poisonous material. At the proper time, the animal is bled, and the serum is separated from the corpuscles, and strained through a filter. If found suitable after being tested, it is used for inoculating The antitoxic serums that human beings. have met with success are those for controlling diphtheria, lockjaw, erysipelas, scarlet fever, and snake venom. The most successful antibacterial serums are those used for the cure of epidemic spinal meningitis, one type of pneu-

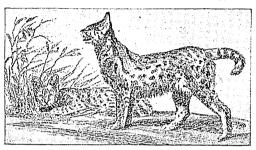
monia, anthrax, and dysentery.

Vaccine therapy is not the same as serum therapy. In the former, inoculations are made with bacterial preparations that stimulate the body cells to develop the antibodies which resist disease. Serum preparations, as indicated above, contain these antibodies. W.A.E.

Related Subjects. The reader is referred in these volumes to the following articles:

Antitoxin Disease (with list) Inoculation Vaccination

SERVAL, sur'val, a large wild cat of Africa, the tawny, black-spotted fur of which appears in the market under the trade name of tiger cat. The animal is about three feet long, and



THE SERVAL

has a sixteen-inch tail and rather large ears. As the African native chiefs wear mantles made of serval fur, these wild cats are being threatened with extermination. They are easily tamed if captured when young, but are difficult to raise. It is said that a serval always shows signs of temper when it sees a black man. In South-Central Africa, where these cats are fairly common, they hide in thick bushes along river banks, waiting for their prey, which consists of small mammals, fowl, and other creatures.

Scientific Name. The serval belongs to the family Felidae. Its scientific name is Felis serval.

[For illustration of other members of this family, see the article Cat.]

SERVETUS, sur ve' tus, Michael (1511-1553), a Spanish physician, scholar, and theologian, who gained the enmity of Roman Catholics and Protestants during the Reformation, and was finally burned at the stake as a heretic. He was born at Tudela, in Navarre. At the age of seventeen, he was sent to Toulouse, France, to study law, but soon transferred his interest to religious questions. For ten years he had a varied existence: first in the train of a Franciscan monk who was confessor to Emperor Charles V; then in the company of various Protestant teachers in Geneva and Basel; later, as an editor of scientific works for a firm of publishers in Lyons; and finally, as a medical student at the University of Paris. He became skilled in surgery, and delivered lectures on medicine and other subjects.

The various books which Servetus wrote were destroyed as fast as found, by Catholic and Calvinist alike; so successful was the hunt that only two perfect copies are known of his last book, *Christianismi Restitutio*. This work had been sent in manuscript form to John Calvin, at whose instigation Servetus was arrested, and condemned to death for heresy. In June, 1553, he escaped, but in October he was discovered in Geneva, and was executed by being burned.

SERVIA, the former name of Serbia (which

SERVICE, sur' vis, ROBERT WILLIAM (1876), a Canadian poet and novelist who won fame for his stirring ballads about life in the Yukon. He has been called the Canadian Kipling, but he must also be given credit for the originality of his material. In some respects, he occupies a position more nearly like that of Bret Harte in American literature, for the poems and stories of both men deal with frontier days, with the rough life of the miner, the hunter, and the trapper. Service's poems have a characteristic swing which suggests the freedom of the Yukon, as he saw it. See CANADIAN LITERATURE (English Canada).

He was born in Preston, England, and was educated in Glasgow, Scotland, where he became a bank clerk. He moved to Canada in 1905, and engaged in farming on Vancouver Island, at the same time making extensive trips along the Pacific coast and through the Yukon. Later, he entered the employ of the Canadian Bank of Commerce, which sent him first to White Horse, and later to Dawson City. After a short time, he resigned his position to devote all his time to writing. Since World War I, in which he served as an ambulance-driver in the Canadian army, Service has lived the greater part of his time in France.

Service's Books. His first book of verses, The Spell of the Yukon, won for him an international reputation, which has been strengthened by his later work, Songs of a Sourdough, Ballads of a Cheechako, Rhymes of a Rolling Slone, and Rhymes of a Red Cross Man. Some of his novels are The Trail of '98, The House of Fear, and The Pretender. For an example of his verse, see PINE (The Pine in Literature).

SERVICE CROSS, DISTINGUISHED. See DISTINGUISHED SERVICE MEDALS.

SERVICE MEDAL, DISTINGUISHED. See DISTINGUISHED SERVICE MEDALS.

SERVIUS TULLIUS, the sixth of the seven legendary kings of early Rome. He is credited with having been the author of a reform in the government by which all landowners, and not merely the patricians, as formerly, became subject to taxation and military service. This was the first time the plebeian class was recognized as being of any value to the Roman state; the reform opened the way for a later struggle for the rights of citizenship. Servius

is said to have added two hills to the five already occupied by Rome, and to have enclosed the whole city with a rampart, wall, and moat. See ROME (The Period of Legend); PATRICIAN; PLEBEIANS.

SESAME, ses' ah me, GRASS. See GAMA GRASS.

SESQUI-CENTENNIAL, ses' kwe sen ten'-ih al, EXPOSITION. See CENTENNIAL EXPOSITION (Sesqui-Centennial Exposition).

SESTET, ses tet'. See SONNET.

SET, Egyptian god of evil. See Osiris.

SETH, one of the sons of Adam (see ADAM AND EVE).

SETI I, sa' te, a famous king of ancient Egypt, who reigned about 1350 B.C. He in-

vaded Syria and met with some success, but encountered the Hittites, who compelled him to turn back. His chief claim to fame lies in the magnificent structures which he erected or began, on many of which are sculptured accounts or representations of his conquests. Among the most important of these is the Hall of Columns at Karnak [see Egypt (Ancient Cities: Thebes)].



SETI I

The head of the mummy of the king and builder who lived at least thirtytwo centuries ago.

The great tomb, with its numerous chambers, which he built, was discovered by Belzoni in 1817, and his mummy, with that of his famous son, Rameses II, was found at Deir-el-Bahri during excavations in 1881.

SETO, sa' toh, a Japanese center of pottery manufacture, near Nagoya. See Japan (The Cities: Nagoya).

SETON, ERNEST THOMPSON (1860-

), a popular writer on nature subjects, identified with the organization of the Boy Scouts of America and the Woodcraft Indians. His real name is Ernest Thompson Seton; he



Photo: Brown Bros

changed it for a ERNEST THOMPSON SETON brief period to Ernest Seton Thompson for literary purposes. He was born in South Shields, England, but was taken to Canada in early boyhood, and between the ages of six and ten, lived on the Western plains. Seton was

educated at the Toronto Collegiate Institute and at the Royal Academy of London, and he also studied art in Paris between 1890 and 1896. Believing that the average boy needs something to do and something to think about, in connection with outdoor life, to become a good citizen, he organized, in 1901, the Woodcraft Indians. He was the chairman of the committee which organized the Boy Scouts of America (which see) in 1910. Seton became Chief Scout of the new organization, and continued in this office until 1915. See Woodcraft League of America.

His Published Works. The animal stories of Seton which he himself has entirely illustrated, are among the most interesting of their kind. They include Wild Animals I Have Known, The Biography of a Grizzly, Lives of the Hunted, Two Little Savages, Animal Heroes, Wild Animals at Home, Wild Animals' Ways, Woodland Tales, Bannertail, and Lives of Game Animals. He also wrote for the Scouts the first handbook of the Boy Scouts of America, and for the Woodcrafters, Woodcraft and Indian Lore and Manual of the Woodcraft Indians.

SETON, MOTHER. See CHARITY, SISTERS OF.

SETTER, set' ur, a hunting spaniel, so called because it was originally taught to crouch low in marking game birds. This was in the days when birds were caught in nets, and the dogs had to creep close to the ground to keep their heads out of the meshes when the net was thrown from behind them. After guns came into use in hunting, setters were taught to raise the forefoot in much the same way as pointers do, in indicating the game. standard English setter (see page 6507), one of the best breeds, is white, with well-marked black or lemon spots. The Irish setter is red, without any trace of black, but it is sometimes marked with white on the chest. A well-known Scottish breed is the Gordon setter, which has a rich, glossy black coat, with dark reddish-tan spots about the head and on the legs. Of the three breeds, the Gordon is the heaviest.

See Dog; Pointer; Spaniel. w.j. SETTLE, T. G. W., Lieutenant-Commander.

See Balloon (Balloon Records).

SETTLEMENT, SOCIAL. See SOCIAL SETTLEMENT.

SEVASTOPOL. See CRIMEA (The Cities). SEVEN CITIES OF CIBOLA, se' bo lah. See CIBOLA, Seven CITIES OF; ARIZONA.

SEVEN SLEEPERS, in legend, seven Christian youths who fled to the mountains near Ephesus, to escape the persecution of the Emperor Decius (A.D. 251). Pursuers discovered their hiding place, and had the entrance blocked. Two hundred years later, an astonished shepherd, who had stumbled upon the cave, discovered seven youths asleep. Awakened, they believed that only a night had passed, and sent one of their number to Ephesus for food. When he offered to pay with coin

two centuries old, he was seized as a thief of hidden treasure, and arrested. Theodosius II, convinced that a miracle had taken place, accompanied the youth in a triumphant pro-cession to the cave, and later had a great church and graveyard built to mark the spot. The seven sleepers survived for only a short time, but all died at the same moment, and were buried where they had slept so long.

In 1928 an Austrian archaeologist,

Franz Miltner, unearthed, in the face of a cliff, in a gorge near Ephesus, a tomb which shows that the tale of the Seven Sleepers has some basis of fact. The ancient church built by Theodo-sius had been covered by other churches, and was discovered only by accident. Of Syrian origin, the legend of the Seven Sleepers appeared in Western literature in the sixth century, and became popular immediately. The subject was a favorite theme in medieval art. Mohammed accepted the legend, for it is told in the Koran.

SEVENTEEN-YEAR LOCUST, a popular name for one of the cicadas. See CICADA; Locust.

SEVENTH-DAY ADVENT-ISTS. See AD-VENTISTS.

BATTLES. See

article WAR OF SECESSION (The Year 1864). SEVEN TIMES ONE (poem). See LAN-GUAGE (First Year).

SEVENTY YEARS' CAPTIVITY. See POPE (Vicissitudes of Papal Power).

SEVEN WEEKS' WAR, the name given to a struggle between Prussia and Austria which took place during the midsummer of 1866. It was engineered by Bismarck, and formed a part of his campaign to unite Germany under Prussian leadership, and to expel Austria from the German Confederacy. The immediate

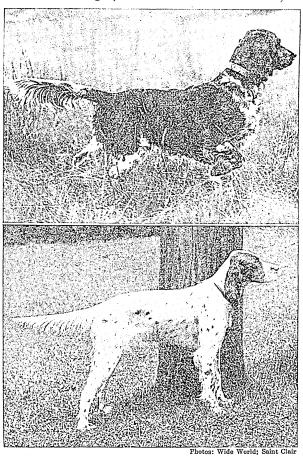
occasion of the war grew out of the Schleswig-Holstein question. These two duchies first entered into Bismarck's scheme when he sought the coöperation of Austria in connection with the internal affairs of Schleswig-Holstein. The resistance of Denmark brought about a war in 1864, by which Schleswig was ceded to Prussia and Holstein to Austria. Bismarck expected trouble in the negotiations of the affairs in these duchies, and it was his ultimate

idea to take Holstein from Austria. The high-handed methods of the military divisions of both Prussia and Austria had caused a reaction in the provinces, and Bismarck was quick to take advantage of the situation. He first proposed that Austria should cede Holstein, because it was too far away to be properly administered. Austria insisted upon compensation for such a cession, and Bismarck refused. When Austria put the turbulent question before the Federal Diet, Bismarck declared that action a breach of the Treaty of Gastein, and sent troops to Holstein in June. Thus the war began.

Two months before, an alliance had been arranged with Italy, more to secure non-interference than to obtain military aid. In return, Bis-

marck agreed to free Venetia from Austria. Most of the North German states joined Prussia, while Austria's allies were Bavaria, Württemberg, Saxony, Hesse, Hanover, and various small states. Following the plans laid out by Von Moltke, the Prussians won victory after victory, and after the Battle of Sadowa, Prussia was in a position to dictate the terms of peace.

On July 26, preliminary terms were signed at Nicolsburg, and though Italy had met with disaster in both the land and naval engagements, it was hesitant to sign the armistice,

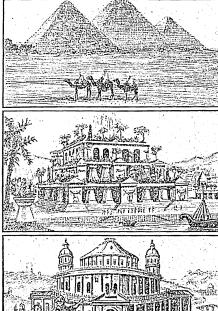


PRIZE-WINNING SETTERS Above, "Willow Brook Danger," declared to be one of America's SEVEN DAYS; finest game dogs. Below, "Saint Clair's Dolores," a fine specimen of female English setter.

SEVEN WONDERS of the ANCIENT WORLD













PHAROS OF ALEXANDRIA THE OLYMPIAN ZEUS

THE PYRAMIDS HANGING GARDENS OF BABYLON TEMPLE OF DIANA

COLOSSUS OF RHODES MAUSOLEUM AT HALICARNASSUS

because Austria refused to surrender Trentino and was upheld by Prussia. The final treaty was signed at Prague, August 23, 1866. By its terms, the old German Confederation was dissolved, Schleswig-Holstein was annexed to Prussia, Austria was forever excluded from Germany, and Italy received Venetia. Prussian predominance in Germany was assured, and Bismarck gained the good will and deep admiration of the German people for his efforts toward a United Germany.

Related Subjects. The reader will find additional information in the following articles in these volumes:

Austria (History) Bismarck-Schönhausen Moltke, Count von

Prussia (Government and History) Schleswig-Holstein

SEVEN WISE MEN OF GREECE, the name commonly applied to seven sages who lived in Greece in the last quarter of the seventh and the first half of the sixth century B.C. Authorities differ somewhat as to the seven names, but the list generally accepted is Bias, Chilon, Cleobulus, Periander, Pittacus, Solon, and Thales. Their wisdom was recognized during their lives, and they gained honor and influence as public men in their own cities. Brief poems

and short, pithy sentences became current, which were supposed to embody their wisdom. Expressions such as "Know thyself" and "Nothing in excess" were attributed to them.

Related Subjects. Biographies of the most important of the seven wise men will be found in these volumes under the headings SOLON and THALES.

SEVEN WONDERS OF THE ANCIENT WORLD. In the second century B.C., Antipater of Sidon, a writer of epigrams, compiled a list of seven masterpieces that the ancients considered to be the most remarkable, for beauty or size, among their works of art. This list of "seven wonders" was compiled from the numerous guide books of the Greeks, for use of the sight-seers of the period. A second list, which is slightly different, has been wrongly credited to Philo of Byzantium. The following works of art are the seven wonders of the ancient world:

Pyramids of Egypt. See Pyramids.

Hanging Gardens of Babylon. See Babylon (Hanging Gardens).

Statue of Jupiter, or Zeus, at Olympia, by Phidias (fifth century B.C.). This was a colossal figure in gold and ivory, representing the god seated on his throne. See Phidias.

Temple of Diana, at Ephesus. See DIANA (Temple of Diana).

Mausoleum, at Halicarnassus. This was a magnificent burial place which Queen Artemisia erected, in 353 B.C., as a memorial to her husband, Mausolus. From his name is derived the word mausoleum. Halicarnassus, which Mausolus selected as his capital, was an ancient Greek city in Caria, on the southwest coast of Asia Minor. In the nineteenth century, a British archaeological expedition, excavating on the site of the Mausoleum, recovered some valuable fragments of architecture and sculpture, and placed them in the British Museum.

Colossus of Rhodes, a huge statue of Apollo, astride the harbor of Rhodes. See Colossus; Rhodes.

Pharos, a lighthouse erected on an island in the Bay of Alexandria, by Ptolemy Philadelphus. See Pharos.

SEVEN WONDERS OF THE MODERN WORLD. The present age is one of supremacy in science rather than in art, and the wonders of the modern world are its great inventions and discoveries. Leading scientists have agreed that the seven most marvelous scientific discoveries are the flying machine, radium, radio (telegraph and telephone), antiseptics, antitoxins, the X-ray, and spectrum analysis.

Radio has given the world instantaneous communication between places thousands of miles apart. The perfection of flying machines is revolutionizing transportation, the mail service, and military tactics. Antiseptics, as used in medicine and surgery, have saved innumerable lives, as have antitoxins, radium, and the X-ray. Spectrum analysis has "permitted an insight into worlds that seemed forever veiled to us," for it shows the chemical composition of the stars in space. The connection between radium, the X-ray, and spectrum analysis, and their relations to the newer knowledge of the structure of matter, are brought out in the articles on those subjects.

Related Subjects. For more detailed information on these modern discoveries, the reader is referred in these volumes to the following articles:

Aircraft Antiseptic Antitoxin Radio Communication Radium Roentgen Rays Spectrum Analysis Surgery

SEVEN YEARS' WAR (1756-1763), a contest which involved practically every nation in Europe and extended its battlefields even to America and India. The quarrel between Frederick the Great of Prussia and Maria Theresa of Austria over the possession of Silesia was the germ of the war. Frederick II of Prussia, some years before, had seized the province of Silesia, and had made good his hold on it in the Silesian wars. Although the Treaty of Aix-la-Chapelle confirmed him in his possession of it, Maria Theresa had never given up the hope of regaining it, and had done

her utmost to form strong alliances against Frederick. Russia joined her readily, and looked forward to receiving a part of the conquered Prussian territory at the close of the war. To bring about an alliance with France, the hereditary enemy of Austria, was a difficult matter, but Maria Theresa, under the guidance of her Minister Kaunitz, wrote a letter to Madame de Pompadour, the mistress of the French king, and solicited an alliance; and the conclusion of an agreement between Prussia and Great Britain made the French decide to aid Austria, for France was then fighting the British in North America.

Frederick the Great, acquainted with all the moves of his enemies, determined to strike first, and in August, 1756, entered Saxony, whose elector, he knew, sympathized with Austria. He defeated an Austrian army sent to the aid of Saxony, compelled the Saxon army to surrender, and made himself master of the entire country. By the beginning of 1757, however, matters looked black for Prussia. Sweden had joined the allies, and thus practically the whole of Europe was united against Frederick, who had as his only ally England, from which at that time he was receiving little help. A subsidy was paid him by England, but the army of English and Hanoverians, which had been sent to his aid, was small and badly officered. Frederick marched into Bohemia, won a battle before Prague, and began a siege of the town, but was defeated at Kolin in June, and driven back into Saxony. The English commander was shortly afterward defeated by the French and forced to make a virtual surrender, which, however, the British government refused to acknowledge. Later in the same year, Frederick won a victory over the French at Rossbach, and one over the Austrians at Leuthen, and made himself master again of almost the whole province of Silesia, which had been retaken by Austria.

When the campaign of 1758 opened, Frederick's position was somewhat more favorable. He had gained favor and prestige through his conduct of the earlier stages of the war, and on the accession of William Pitt to power in England, a policy of more active aid to Prussia was adopted. A new army was organized under Ferdinand of Brunswick, who, during the remainder of the war, won several victories and was of great help to Frederick. The contest began in 1758 by a defeat of the Russians, and though Frederick was himself shortly afterward beaten, he managed to retain possession of both Silesia and Saxony. A severe defeat at Kunersdorf, in 1759, reduced Prussia well-nigh to a state of exhaustion, but the victories of the English over the French in that same year bettered matters somewhat. Frederick won two brilliant victories in 1760, but the death of George II of England, and Pitt's fall from



power, took from Prussia its only ally, and made its ruin seem inevitable.

In 1762, at the most critical time, Elizabeth of Russia died, and was succeeded by Peter III, an enthusiastic admirer of Frederick. Prussia made a treaty with Russia, and Frederick won several minor victories, but Peter was deposed, and plans for an active alliance between Russia and Prussia were at an end. Russia did not, however, again join Austria, and as both sides were practically exhausted, peace was concluded at Hubertsburg early in 1763. Frederick was allowed to keep Silesia, and other boundaries remained as they had been before the war, with no territorial changes in Europe. The Treaty of Paris, which settled the disputes of France and Spain on the one hand and Great Britain and Portugal on the other, was signed February 10, 1763.

Influence in America. By no means the least important part of this conflict was the struggle between France and England, which ended by wresting from France its colonial possessions in America and making England supreme in India. In American history, this struggle is known as the French and Indian

War.

Related Subjects. Further information about the Seven Years' War in its various phases may be gained from the following articles in these volumes:

Austria-Hungary Clive, Robert Frederick (II, Prussia) French and Indian Wars Kaunitz, Prince Maria Theresa

Montcalm de Saint-Veran, Marquis de Paris, Treaties of Pitt, William Pompadour, Marquise de Silesia Wolfe, James

SEVERN RIVER, one of the principal waterways of England, formed by the union of two small streams which rise in Mount Plynlimmon, in Wales. It flows in a circuitous route through England, and discharges into the Bristol Channel through an estuary several miles wide, under which runs a tunnel about four miles long. Its total length is 210 miles, and it is navigable as far as Welshpool, a distance of 180 miles. The river is connected by canals with the Trent, the Thames, and the Mersey. Great tidal waves have frequently caused serious inundations on its banks. A scheme is under consideration for constructing a barrage across the Severn, to utilize the tides for the production of electrical power. The principal cities on its banks are Gloucester, Worcester, and Shrewsbury.

SEVERUS, se ve' rus, Alexander. See

Rome (The Decline of the Empire).

SEVERUS, Lucius Septimus (146-211), a Roman emperor, of whose family and early life little is known. He was in Gaul when the Emperor Pertinax was assassinated, in March, A.D. 193, and at once set out for Rome with his troops, who had declared him emperor.

Julianus, meanwhile, had purchased the imperial dignity from the Praetorian Guard (which see), but Severus acted with great decision and promptly hastened to Rome, where he posed as the avenger of Pertinax. The Praetorians were disarmed without a blow, and a new body of household troops was enrolled, which became a chosen corps of veterans.

Severus punished the murderers of Pertinax, and then went to the East to put down a rival to the throne, Pescennius Niger, whom he defeated in 194. On his way back, he took Byzantium, after a siege which lasted over two As Severus neared Italy, he was informed that Albinus, commander of the Roman legions in Britain, had in the meantime been declared emperor by his troops. Stopping in Rome only long enough to impress the Senate with his power, Severus pushed on into the north. In 197 he met Albinus on the plain between the Rhone and Saône, and gained a complete victory. He then returned to Rome, and established his power by methods as cruel as those of Nero.

From 197 to 208, he conducted a successful campaign against the Parthians, explored Egypt, and gave his attention to the organization of the empire. In 208 he went to Britain, where he penetrated to the extreme north of the island, losing many of his men; and to guard the people of the south from the invasions of the Highlanders, he built a wall across the island from the Tyne to the Solway Firth (see ROMAN WALLS). He died at York

on February 4, 211.

SEVIER, se veer', John. See Franklin. SEVIER RIVER. See Utah (Rivers and Lakes).

SEVILLE, se vil', OR SEVILLA, sa veel' yah.

See Spain (Principal Cities).

SEVRES, sa' v'r, TREATY OF, a treaty concluded between the allied and associated powers and Turkey, after the World War, signed by Turkey at Sèvres, France, August 10, 1920. It provided that the Arabian states, Syria, Palestine, and Mesopotamia (now Iraq), were "provisionally recognized independent states to be advised by man-datory powers." Turkey was to renounce all rights over territory in Northern Africa, and to cede Eastern Thrace to Greece. Smyrna and the Ionian hinterland were placed under Greek administration for five years. Armenia was to be recognized as an independent state. Navigation of the straits, including the Dardanelles, the Sea of Marmora, and the Bosporus, was to be open to every vessel, without distinction of flag, in peace and in war. An international commission would be appointed to control this neutral territory. Other terms of the Sèvres Treaty involved the reduction of the Turkish army to 50,000, and surrender of Turkish aircraft and all the fleet, with the exception of a few ships and torpedo boats. A financial commission representing Great Britain, France, and Italy was empowered to control the budget and finances of Turkey.

The Sèvres Treaty was never ratified, for a successful revolt against the Ottoman government was organized by Mustapha Kemal Pasha, and a new independent state was created, with Ankara (Angora) as its capital. The new government repudiated the treaty, and Mustapha Kemal Pasha defeated Greece in a local war, a success which made abortive many of the clauses of the agreement.

Related Subjects. The sequel to the story of the Treaty of Sèvres will be found in the article Lausanne, Treaty of. See, also, Kemal, Mustapha; Smyrna; Iraq (The New Kingdom); Turkey (History).

SÈVRES PORCELAIN. See Porcelain, subhead

SEWAGE AND SEWERAGE. Sewerage is a system of pipes and conduits for conveying waste matter, or sewage, from houses and factories, and depositing it at a safe distance from centers of population. Sewers also drain off either the whole or a part of the surface water of land; in this connection, they are more commonly known as drains. A single system of conduits carrying both sewage and rainfall is known as a combined system. The most satisfactory system, however, supplies separate pipes and conduits for surface water. Where the combination plan is used, it is not uncommon for sewers, choked by the sudden influx of rain water, to discharge sewage backward into cellars and basements.

In the great cities of the modern world, the disposal of sewage is a problem of first importance; scientific methods are indispensable for the preservation of community health, and are a vital problem of engineers, health departments, and municipal officers generally.

The commonest type of sewerage system is the so-called water-carriage system, in which waste materials are diluted with water and conveyed away from town or city by natural flow, or gravitation. The sewage is conducted, through pipes of varying caliber, from private homes to public conduits of considerable diameter, and discharged at a distance, often into streams or into the sea. On the farm or in small villages, it is practicable to dispose of waste in the soil, but such methods will not serve in dense centers of population.

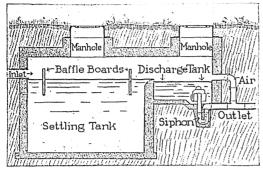
The house drain, which is of glazed stoneware, from four to six inches in diameter, discharges its matter into somewhat larger pipes of earthenware or cement, and these, in turn, empty into larger conduits of brickwork or cement, called *mains*. The ordinary sewer pipe is made of salt-glazed, vitrified earthenware, having a smooth surface, so as not to impede the flow. It is made in short lengths, having a socket at one end, into which the next length of pipe is fitted. A bit of hemp packing and portland cement close the joint.

The larger sewers, or conduits, are constructed of several layers of brick resting on a cement bed, or of cement itself. Their diameter may be very great, to accommodate populous neighborhoods. All the pipes of the system are set at a uniform gradient, so as to give a steady flow, which should be at least 2½ feet a second. Where the ground is quite level, it is sometimes necessary to facilitate the flow by means of pumps. The decomposition of sewage gives rise to poisonous gases, and in the interest of health, sewers are ventilated; that is, shafts with iron gratings are placed at frequent intervals, so that air may reach the conduits. When large enough to permit a man to descend to clean or inspect the sewer, these are called manholes. Such manholes are placed at each change of direction of the conduits, and at junctions with the branches. Not all the gas, of course, escapes through the shafts; it is customary, therefore, to protect sinks and washbowls from an influx of gas, by fitting an elbow in the pipe, which holds enough water to exclude noxious fumes.

When cities are situated on the seaboard or the shores of large lakes, the sewerage system usually empties into deep water. Rivers are also used for this purpose; theoretically, after a flow of five miles through running water, thorough purification results. With the enormous growth of American and Canadian cities, however, this generally prevailing practice has sometimes resulted in a certain amount of water pollution, owing to vast quantities of sewage and lack of sufficient water to purify it. Of recent years, increased attention has been given to scientific methods of sewage disposal practiced in England and on the continent of Europe. There the sewage is often treated with chemicals in huge tanks, lime alone, or lime in conjunction with aluminum or ferrous sulphate, being used as a purifier. Septic tanks and contact beds or sand and percolating filters are becoming increasingly common. In septic tanks, bacteria convert harmful organic matter into harmless minerals. Contact beds are water-tight compartments, filled with broken stone or clinkers, in which the sewage is acted upon by bacteria and purified. Such methods of clarifying sewage are expensive, and have not yet been widely adopted in the United States or Canada.

The activated-sludge process, which is gaining favor, takes the sewage as it comes to the works, or, in some cases, after it has been passed through screens to remove part of the solid matter, and passes it through activation tanks, which have porous plates or perforated pipes at the bottom, through which air is forced at low pressure, thus keeping the contents agitated. This "boiling" action keeps

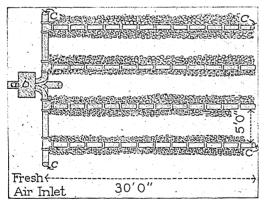
the sewage and sludge in suspension. The liquid portion of the sewage and some of the sludge are drawn into settling tanks, from which the liquid, by this time clarified, is carried to a stream or other body of water. Often



A SEPTIC TANK

Sewage enters at one side and is prevented by the baffle boards from causing a direct flow across the tank. When the settling tank is full, any excess trickles into the discharge tank. As this gradually fills, the air in the cap of the siphon is compressed until it suddenly forces out the contents of the siphon, drawing after it the water in the discharge tank. The pressure of the air in the air pipe prevents the absolute exhaustion of water from the siphon, which would cause a gradual instead of a sudden discharge.

the sludge is dehydrated and sold for fertilizer. The largest activated-sludge plant in the world was put into operation in Chicago, in 1928. Here, after treatment in the settling sludge-digesting tanks, the sludge is dried on openair beds; later, machines strip the beds and dump the dehydrated sludge on land along the



SUB-SURFACE IRRIGATION

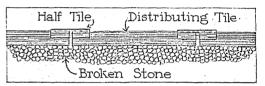
(a) Pipe from septic tank; (b) distributing pit; (cc) fresh air inlets. The total amount of tile should be more than one lineal foot for each gallon flowing from the tank in a day. The distributing pit is a small brick chamber with an inlet at the back and two outlets at the front, either of which can be closed.

Chicago Drainage Canal. There is an activated-sludge plant projected for New York City, to be located on Ward's Island.

Besides the sewage, there is a considerable amount of waste matter, such as ashes and garbage, which cannot be disposed of by the sewerage system. This is collected in carts and burned at incinerating plants, or deposited where it cannot do harm. In the more scientific method of disposal, reduction plants convert much of this waste into grease and other salable commodities.

Sewage Disposal on Farms. Owing to engineering progress, people now dwelling in the rural districts may without undue expense enjoy the convenience of running water in the home. Many farmers and suburban dwellers, however, though aware of their ability to install pumping machinery, refrain from doing so because they do not know what to do with their sewage. But here, too, science has come to their aid, by devising schemes for employing the purifying forces of nature.

The chief danger from unscientific handling of drainage, as in carelessly built, old-fashioned cesspools, is, of course, contamination of wells.



THE TILES

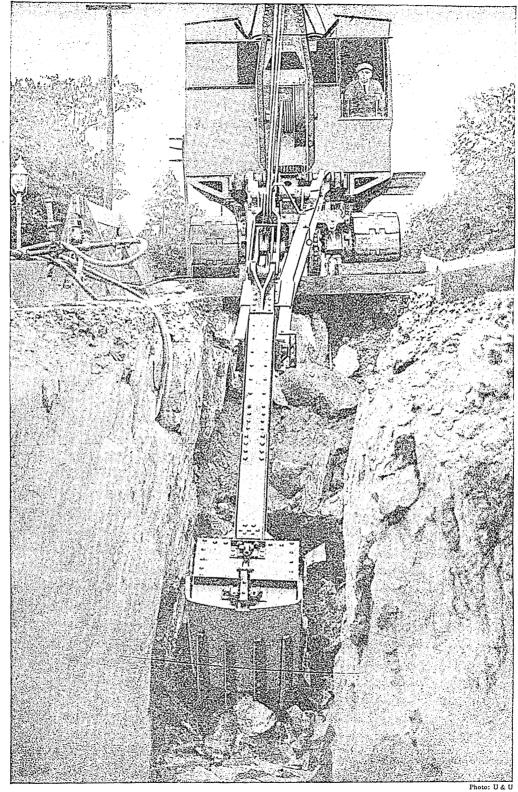
The distributing tiles are about eighteen inches below the surface, and slope gradually away from the pit. In heavy soil, or in regions where frost penetrates deeply, they should be laid in crushed stone or cinders, as shown. In some cases it is also advisable to have drain pipes beneath this porous foundation. The tiles are laid as illustrated, with their ends about half an inch apart, the half tiles being added on the upper sides of the joints, to keep out sand and dirt.

But under the system here described, and under many others which have been designed by scientific men for special conditions, sewage may be handled with even better results than are obtained in cities.

This system combines what is known as a septic tank and subsurface irrigation. Its effectiveness arises from the fact that in all surface soil there are certain bacteria which are able to render waste matter harmless, if it is liquefied and well distributed.

The sewage first enters the septic tank, which is closed both to air and to light, and here, in a period of twelve hours or more, its own bacteria break up most of the solid matter. The tank is usually of brick, concrete, or steel, and ought to be far enough in the ground so that its contents will not fall below the temperature of 60° F. If the size of the tank is properly proportioned to the amount of sewage, it will not be necessary to clean it, except at long intervals.

About four times a day, a part of the contents of the tank is discharged into the dis-



Surpasses the Toilsome Efforts of Many Men. A sewer-digging machine at work in a progressive community in New York state. 6513

tributing pipes, as explained beneath the second diagram. The suddenness of the action causes the liquid to be distributed through all the pipes, whence it seeps into the soil and is taken care of by nature. Heavy soils may, in the course of a week or two, become saturated, so that the bacteria are unable to do their work; for this reason, the distributing system is designed in two parts, so that the flow can be given to one section of the soil for several days,

while the other part rests.
SEWARD, su' urd, WILLIAM HENRY (1801-1872), an American statesman, Secretary of State during the War of Secession, and a

powerful aid to Lincoln in the councils that determined the policy of the nation during that struggle. He was born in Florida, Orange County, N. Y., was educated at Union College, New York City, and admitted to the bar in 1822. He was governor of New York from 1838 to 1842, and in 1849 entered the United States Senate, where he becamé a party leader. Seward firmly of slavery, and vigorously opposed the Compromise of 1850 and the Kansas-Nebraska Bill.

Lincoln for the Presidential nomination,



WILLIAM H. SEWARD

resisted the extension He sought the Presidential nomination in 1860, but Abraham Lincoln won it. Seward became the great Secretary of State of Lin-coln's Cabinet, but was held up to ridicule when he purchased Alaska—"Seward's Frog Pond"—from In 1860, when de-feated by Abraham Russia. It proved to be one of the best investments

Seward exerted himself to secure Lincoln's election, and later was appointed Secretary of State. In this high office, he reorganized the diplomatic service and succeeded in preserving the confidence of Europe, which had been ready to give support to the Confederacy. On the night of Lincoln's assassination, Secretary Seward was confined to his room by a fall from his carriage, but he was also a victim of the conspiracy, and was seriously wounded by an accomplice of Booth. He slowly recovered, and retained the office of Secretary of State under Andrew Johnson. Among the important tasks that he accomplished were the adjustment of the Trent Affair and the Alabama Claims, and the negotiation of the treaty by which Alaska was purchased from Russia. Though time has justified the purchase, the great territory was mockingly called "Seward's Folly" and "Seward's Frog Pond."

Related Subjects. The reader is referred in these volumes to the following articles:

Alabama, The Alaska (History) Booth (family)

Compromise of 1850 Kansas-Nebraska Bill Trent Affair

SEWARD GLACIER. See LOGAN, MOUNT. SEWARD PENINSULA, in Northwestern

Alaska. See Alaska (Map).

SEWING, so' ing. In the days of our grandmothers, the sewing connected with the furnishing of the home and the clothing of the family was as much a part of every woman's daily task as was the setting of the table or the making of the beds. Often these good and capable housewives took the flax from the plant or the wool from the sheep, spun it into yarn, and then wove the yarn into the cloth which was used for making towels, sheets, and tablecloths, and clothing for the family. There have been times when every article, excepting the boots or shoes, but including the straw hats, the men's suits, and other articles of wearing apparel, has been fashioned by a woman's hands. In those days, the spinning wheel and the loom were seen in every home. It is such a picture Longfellow gives us in Evangeline, when he says:

Close at her father's side was the gentle Evangeline seated,

Spinning flax for the loom, that stood in the corner behind her.

Silent awhile were its treadles, at rest was its diligent shuttle.

While the monotonous drone of the wheel, like the drone of a bagpipe,

Followed the old man's song and united the fragments together.

And again, later in the same story, how much these words tell us of the women of that day: Simple that chamber was, with its curtains of white and its clothes press

Ample and high, on whose spacious shelves were carefully folded

Linen and woollen stuffs, by the hand of Evangeline woven.

This was the precious dower she would bring to her husband in marriage,

Better than flocks and herds, being proofs of her skill as a housewife.

A Revolution in Production. But, in the beginning of the nineteenth century, great changes came about in the social and economic life of the American people. The growth of purely industrial activities, the rise of manufacturing centers, and the growth of cities brought about a complete revolution. Mills and factories sprang up all over the eastern part of the continent, and soon the rag carpets and the beautiful coverlets and the homespuns were laid away in the attic or given away, and their place was taken by the new commercial products.

But this was not all. The girls and women found employment in these factories, and soon

the arts of the home—sewing and cooking, sometimes called the Home Sciences—were rapidly becoming lost arts. Not only were spinning and weaving forgotten, but even plain sewing and mending were no longer familiar subjects to the girl; and since such a very large percentage of girls marry and have homes and families, this ignorance was soon very evident. When the women of the country realized the existing conditions, it was apparent to some of them that a solution must be found by which sewing could be revived and encouraged. The home had given up teaching the girls how to sew, and since this knowledge is so necessary to a girl's complete education, the school was considered the logical place in which to begin such instruction.

The women of Boston, assisted financially by Mrs. Hemenway of that city, were the first to succeed in having sewing taught in the schools. That was in 1854. The legislature of Massachusetts legalized the teaching of sewing in 1876. From this modest beginning, the teaching of sewing has spread until it is included in the course of study of every up-to-date elementary, high, and normal school, and of most colleges. There are many commercial institutions specializing in the teaching of sewing, and new books on the subject are constantly being added to the list. There are also many courses in sewing offered by American correspondence schools.

To-day, no girl's education is complete unless it includes enough instruction in sewing to enable her to prove her skill as a housewife, to be able to purchase materials intelligently, to appreciate what is good in design, what material is appropriate for each garment or household article, and the proper clothes for all occasions. Every girl should know how to make her own clothes, and also how to alter ready-to-wear clothing and add those little touches which make her clothes individual and characteristic of the well-dressed woman. The courses of instruction offered have done so much to revive the appreciation of sewing that we find such quotations as the following, taken from Gene Stratton Porter's Laddie:

The gay belles of fashion may boast of excelling In waltz or cotillion, at whist or quadrille; And seek admiration by vauntingly telling Of drawing and painting and musical skill;

But give me the fair one, in country or city,
Whose home and its duties are dear to her heart,
Who cheerfully warbles some rustical ditty,

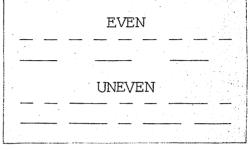
While plying the needle with exquisite art: The bright little needle, the swift-flying needle, The needle directed by beauty and art.

The location of the school, the economic condition of the people, their customs, the fashions of the day, and the aim sought, largely determine a course of study in sewing for the girls of any institution.

Fundamental Stitches

Hand sewing should be taken up first, and the student should become familiar with all the stitches used in plain sewing. The following are the fundamental stitches to master:

Basting. The basting stitch is a temporary stitch used to hold two pieces of material together and to serve as a guide to the permanent

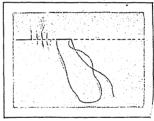


BASTING STITCHES

sewing. In even basting, the stitches and spaces are of the same length. In uneven basting, the stitches and spaces are uneven.

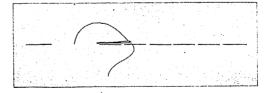
Running Stitch. The running stitch is a small regular stitch made by passing the needle

over and under an equal amount of material. The needle is worked in and out of the material, as many stitches being taken on the needle as possible. Then the stitches are slid back on the



RUNNING STITCH

thread, and the needle is jogged forward again Backstitching. This stitch is used in place of machine stitching. It gets its name from the fact that the needle is always set back into

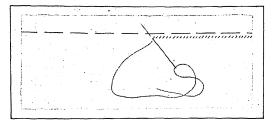


BACKSTITCHING

the last stitch made. Begin by taking two small stitches in the same place, in order to fasten the thread; then insert the needle back of the thread, and bring it out the length of a stitch in advance of the thread.

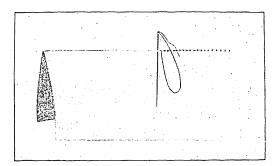
Hemming Stitch. This stitch is a slanting stitch used to hold a folded edge down to the material, and is made by placing the needle through the material and the folded edge or

the hem. Slant the needle slightly, and make the stitches small, keeping the slant and the distance between the stitches uniform.



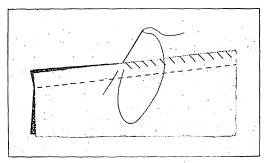
HEMMING STITCH

Overhanding Stitch. This stitch is a straight stitch used to join folded or selvage edges.



OVERHANDING STITCH

Insert the needle at right angles to the edge of the material. Do not take too deep a stitch; otherwise a ridge will be seen.



OVERCASTING STITCH

Overcasting Stitch. This is a loose stitch made over raw edges to prevent raveling.

Practice Work

In order to become familiar with these stitches, it is well to work out problems on which they may be used

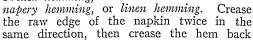
which they may be used.

The Towel. This problem serves as a type, and has many lessons in it as a preparation for systematic study. The towel may be made of cotton, linen, or union (see Cotton; Flax). Become familiar with the words warp, woof, and selvage, and study their meanings (see

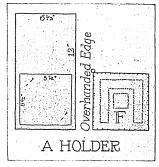
WEAVING). Straighten the edges by drawing a thread and cutting in the line thus formed. Turn a hem by folding the material twice in

the same direction. Baste and hem, using the stitches described above.

The Napkin. The overhanding stitch may be well illustrated in hemming table-cloths and napkins, and when so used, is called French hemming,



on the front side of the napkin, the width of the hem. This step gives you two folded edges, and by following directions in the section on overhanding, you will have learned the correct method of hemming table linens.



TOWEL

Straight to thread

Woof Threads

The Holder. Making a holder (for lifting hot dishes) affords a good problem in measuring, folding, basting, and overhanding. Use unbleached muslin, crash, cretonne, or washed ticking. Cut the material twelve inches on the length and six and one-half inches on the width. Fold on the long edges, and stitch the opposite sides, using the backstitch as described above, or stitch on the machine, making a half-inch seam.

Cut five-inch squares of cotton batting or flannelette; slip into a holder; turn in one-half at open end, and overhand together. A simple quilting design may be made by using the running stitch (see above). A ring or tape for hanging should be fastened at one corner.

Underwear. Every effort should be made to have the underwear garments as dainty and beautiful as possible. Here is a case where neat and careful handwork shows to advantage. Keep facings and hems narrow. If decoration is desired, keep it simple. Avoid deep and glaring colors. The French seam and the felled seam are used on all undergarments; both seams must be very narrow, varying from one-eighth inch or less to a quarter of an inch in width. It requires skill to make these narrow seams, as does the

8.4



THREE SLIPS AND A SMOCK
(1) A straight slip; (2) a bias slip; (3) a built-up shoulder slip; (4) a smock.

sewing on of laces, insertions, and insets for decoration. The present vogue for straight lines is exemplified in the construction of undergarments that are suspended by straps from the shoulders. These are simple and easy to make, since they require neither the plackets nor the fastenings of a few decades ago. The built-up shoulder type of slip keeps its place much better on the body than the slip with straps and requires more technical skill in the finishing of the neck and armhole. It serves to hold in position dresses of chiffon and net.

For any of the three slips shown in the accompanying illustration, use batiste, nainsook, cotton crêpe, crêpe de chine, dimity, pongee, or satinette. These materials are very practical for garments needing frequent washing, for they launder well. Two lengths of material, to which the width of the nem has been added, will be required. No. I baby ribbon and lace may be purchased, of a quality corresponding to the taste of the wearer and the amount of money she wishes to put into the garment.

No pattern is necessary for the straight slip with shoulder straps. For other styles use the commercial pattern bought according to one's bust measure. Directions for using the commercial patterns are printed on the envelope. French seams are used on the side seams. The straight edges are hemmed and all curved edges are faced. If extra fullness is required it may be secured by adding a plait at the center of the back. It is im-

portant that the straps be of the right length, to prevent falling off the shoulders. They should be neatly and securely fastened. Careful attention should be given to every detail of the work.

Smock. The smock of today is a colorful, attractive garment worn over the dress to protect it. The name <code>smock</code> is the Old English <code>shift</code>, or <code>chemise</code>. This garment takes the place of the apron of former years. It is popular with the girl in the office, the schoolgirl, and the young matron in the home. The smock is made of printed cotton materials or colored pongee; and if plain material is used, smocking or colored embroidery makes a very attractive decoration.

Smocking. This is decorated gathering. It is used especially in the adornment of the national costume of the Hungarians, and in parts of England. To make smocking, follow the directions below:

Make a row of dots three-eighths inch apart. Work from left to right. Fasten the thread at the first dot, and take up the stitch at the second, letting the thread hang downward. Take up stitch at third dot, having the thread above the needle. Continue so across the line.

Outside Skirt. The separate skirt to be worn with a blouse or sweater is attached to a lining of lightweight material made from a pattern as in the case of the slips described above. Some skirts are held in place by a band or belt. Skirts may be plain or plaited.

Sports Dress. One should have no difficulty in selecting materials, in this day of ex-

quisite weaves and designs. The figure of the person who will wear the dress must be considered first. Always remember that vertical lines slenderize the person, while horizontal

SPORTS DRESS

lines tend to shorten the height. The occasion for which the dress is designed must also be carefully studied. After you have selected a simple, becoming pattern, and have read the directions for that particular dress, which are printed on the envelope, you are ready to begin. Be sure you cut all pieces on the same grain of the cloth, matching all plaids and checks. Follow all markings carefully, bringing like notches together, and you will have a very successful dress. The trimming should not be conspicuous;

it should appear to be part of the material itself. Plaits. Plaits help in giving straight-line effects, and are used on all types of material that crease well enough to hold them in place.

Plaits are classified as knife, box, inverted, accordion, and sunburst. They should be made deep enough to hold in place when the dress is in repose. To insure good effects, plaits should be made on the lengthwise grain of the material.

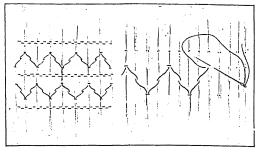
> Fastenings. If fastenings are not put on with the



SMOCKING STITCH

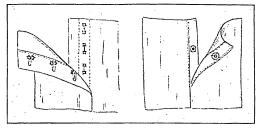
greatest care, they mar the whole appearance of the dress. The ball of the snap is always placed on the top side of the garment, and should be directly above the socket of the snap. When hooks and eyes are used, the eye must be set back on the under edge, so that, when the hook is in place, neither is visible.

Mending. Skilful darning and mending is a fine art, whether it be a dainty piece of lace or the everyday stocking that requires repair.



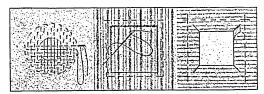
COMPLETED STITCH AND DETAIL

The plain weave of one over and one under, done with the needle and darning cotton, enables the darner to economize more than she



HOOKS AND EYES; SNAPPERS

might expect. Happy, indeed, is she who can skilfully darn her dress or table linens, thus prolonging their usefulness and conserving



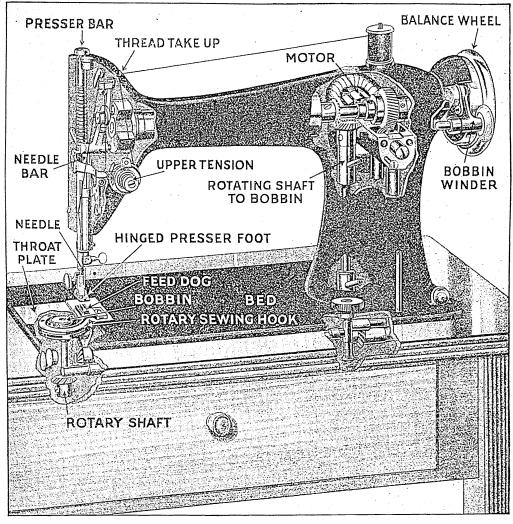
DARNING AND PATCHING STITCHES

their appearance. The hemmed-on patch and the set-in patch are easily recognized by their names, the former being used where strength is required. Cut the cloth at least half an inch larger than the hole, and be sure to have it lie in the same direction as the threads of the cloth. Hem the patch to the back of the cloth, and then hem the cloth around the hole to the patch on the right side.

Related Subjects. In connection with this article on sewing, the reader may refer to the following topics in these volumes:

> Button Calico and Calico Printing Costume Cotton Dimity Dress Flax

Gingham Industrial Art Lace Linen Muslin Satin Silk Wool



PARTS OF A MODERN SEWING MACHINE

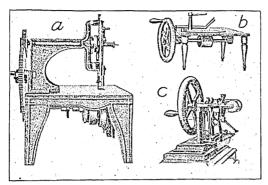
Also consult the articles on such collateral household subjects as

Costume Knitting
Embroidery Spinning
Home Economics Weaving

SEWING MACHINE, so' ing ma sheen', a device that has lightened the household labors of mothers in every civilized country and made possible a stupendous development of the clothing industry. One usually thinks of Elias Howe (which see) as the inventor of the sewing machine, because his model, which was patented in 1846, was the first practical machine successfully put upon the market. At least two other men, however, had previously worked out the idea of a device to take the place of hand sewing. The first, an Englishman named Thomas Saint, patented a wooden machine in 1790, which made a single-thread chain stitch. The thread was automatically fed to the needle,

which had a notch instead of an eye, and an awl made holes for the needle to pass through. This machine, however, did not give practical results. Forty years later, a Frenchman, Barthélemy Thimonier, patented a machine that was actually used to make soldiers' garments. The French government had eighty of his machines in use at one time, but a misguided mob of workmen wrecked the factory and almost killed the inventor, and Thimonier was never again able to create public interest in his device. He used a hooked needle that made a stitch by passing backward and forward twice through the cloth.

Howe's machine, upon which all doublethreaded models of to-day are based, had a needle with an eye near the point. A shuttle, below the cloth, carried a lower thread on a small bobbin, and the needle was fastened to an arm that vibrated on a pivot; its movement forced the needle through the cloth, producing a lock stitch. Nearly all domestic machines of to-day are of the double-thread, lock-stitch type, though some housewives prefer the single-



FIRST DESIGNS

(a) The Singer; (b) Wilson's earliest pattern; (c) the sewing machine of Elias Howe.

thread chain-stitch machine, such as the Wilcox and Gibbs. The lock stitch is much like weaving in formation, and is less likely to ravel than the chain stitch, which is something like the stitch in knitting. Of the inventors who followed Howe, A. B. Wilson and Isaac Singer deserve special mention. The former introduced the four-motion automatic feed used on nearly all modern machines, and the latter the treadle operated by foot, and a presser foot with a yielding spring, which holds the fabric down on the feed plate.

Sewing machines are now made in hundreds of varieties for every kind of sewing imaginable. Fine hand sewing and hand embroidery are imitated by machines which will stitch in any direction; other machines do hemstitching and tucking and hemming, sometimes with twelve needles in a row on one machine; other machines make buttonholes; and still others sew on buttons. There are special machines for sewing boots and shoes, books, umbrellas, and brooms. There is even a very ingenious machine for sewing carpets together; this travels along the carpet it stitches, because the carpet is too heavy to be moved easily. The electric sewing machine, invented more than fifty years ago, has been used increasingly during the twentieth century.

SEX. See MENTAL CONFLICT.

SEX, in population. See Population; SEX RATIO.

SEX EDUCATION. For over twenty-five years, there has been developing a strong movement in favor of teaching children and adolescents the essential facts regarding sex and reproduction in human life. Such special education is a phase of social hygiene, which deals with all problems which trace their origin

to the sex instinct. The American Social Hygiene Association and the British Social Hygiene Council are the two leading organizations concerned with research and educational work in this field.

The influence of the sex-education movement has become so widespread that the majority of intelligent parents and teachers now believe that all young persons between childhood and maturity should have some instruction concerning their developing sexual functions. The only essential difference of opinion appears to be on the questions whether the instruction should be entirely in the home or partly in school, and whether young people should receive detailed information regarding sexual processes and their relationships to health, morals, marriage, and parenthood.

It is now generally agreed by all educators and parents who are well informed concerning social hygiene that all young persons need guidance on many sex problems, extending from questions affecting health and attitude in childhood to the very intricate relationship of marriage and reproduction. Guidance of the sexual instincts of young persons by education in home or school, or both, is necessary, because in human life, sexual conduct is on the basis of intelligent choice of the individual. Unlike the higher animals, human beings have no instinctive physiological control which limits sexual excitement to periods which are favorable for reproduction. Obviously, control or management of human sexual instinct depends upon the choice of the individual; and whether the individual will choose to control his conduct or not depends upon various motives and reasons which sex education now aims to present to young people. The age-old policy of silence and mystery concerning sex was sure to fail, because control of sex actions must depend on knowledge.

The American and British leaders in sex education emphasize the importance of developing in children a wholesome and refined attitude of mind toward sex, in place of the age-old vulgarity which is widespread. Experience with thousands of children taught in homes and in schools during recent years proves that sex instruction will go far toward developing respectful and esthetic attitudes and ideals which tend to control conduct.

Next in importance to teaching that sex is a natural and dignified part of life, young persons of adolescent years should be taught the meaning and importance of the family, marriage, and parenthood. This development of "family attitude" is stressed by many teachers of psychology, sociology, and home economics in high schools and colleges. Teachers of biology also have a logical opportunity for discussing the family in relation to heredity and eugenics.

While leaders in social hygiene have tended to place the greatest emphasis on constructive teaching for developing attitude and ideals and in preparation for marriage, they have not neglected practical teaching concerning the hygiene and physiology of sex in the individual. It is agreed that young people should learn all the scientific facts of sex needed to protect their mental and physical health. The original emphasis in Europe and America was on sex instruction, which included much medical knowledge concerning the venereal diseases, but the present tendency is toward giving adolescents a limited amount of information concerning the nature and causes of such diseases. This is sufficient warning against immoral conduct as the common source of these social diseases.

Sex education is not a new school subject. There should be no special sex courses in high schools and colleges for general education. The facts of life which concern sex should be taught in their normal settings in regular courses in nature study, biology, hygiene or health education, physical education, psychology, general literature, social sciences, and home economics (home-making education). In these subjects, much indirect teaching concerning sex and its relation to life is now included in the courses of study of numerous high schools and colleges.

The value of sex instruction has been attested by thousands of young parents who have been receiving such instruction in high schools and colleges, and who have written or said that they want their own children to get more complete information on the subject.

Sex education should be a permanent part of the education of young people, because each individual has a right to be prepared to meet the problems of sex which come into the adolescent and later life of every normal human being.

M.A.B.

[Readers who wish to pursue this subject further should write to the American Social Hygiene Association, New York City, for a free bulletin which lists books and pamphlets selected for students, parents, and teachers. The United States Public Health Service, of Washington, D. C., and many state boards of health, distribute some excellent pamphlets which have been prepared for general readers.]

SEX PROPORTION. See Population (Sex).

SEX RATIO. Science has long sought to learn why more males than females are born to human parents, but Nature's secrets remain undisclosed. The study of thousands of birth records reveals the proportions of births in the sexes, in both the human family and in the lower animals, and all that has been learned is that the relative number of males and females among the newly born young is influenced by

the time of the year mating takes place, the size of the previous family, and the interval that has elapsed since the last birth. It has been asserted that, among humans, more malebabies are born, because in that manner Nature recompenses man for the ravages of war, which takes heavy toll of males. Such a theory, however, lacks scientific basis, and is unacceptable.

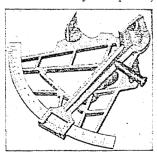
In all the higher animals, man included, the number of males and females born runs nearly, but not quite, equal. There is always a slight preponderance in favor of one sex or the other. which varies from species to species. Thus, in the human race, the ratio of boys to girls is between 103 and 107 to 100. Among horses, female colts are more numerous than males, the male-female ratio being 98 to 100; and the same ratio prevails among sheep. Happily for those who are in the egg business, pullets are more numerous than cockerels at hatching, with a ratio of 95 male chicks to 100 female chicks. But with pigeons, the numerical supremacy of the males is restored, with a ratio of 115 to 100.

The sex ratio varies with the seasons of the vear. A study of the birth records in grevhound kennels shows that December breedings average 88 male puppies to 100 females, while the average ratio of male to female for September breedings is 122 to 1∞. Similar records show that the colts of warm-weather matings among horses are in almost the same proportions as those of cold-weather matings, but that other farm animals show a wider range. Among cattle, the warm-weather ratio is about 114 to 100, as compared with 103 to 100 when the mating takes place in the fall and winter. Sheep show a ratio of 102 to 100 for the warm months, as compared with 94 to 100 in cold weather; and pigs show ratios of 115 to 100 and 109 to 100, respectively, for summer and winter matings.

SEXTANT, an instrument for measuring the angular distance between any two points,

such as the sun and the horizon. It is used most commonly by sailors in determining the position of a ship at sea.

A sextant consists of a frame supporting the graduated arc of a sixth part of a circle, a radial



A SEXTANT

arm traveling over this arc, two mirrors, and a small telescope. The fixed mirror is known as the *horizon glass*, because it is trained on the horizon; the movable mirror, screwed to the

head of the radial arm, or index bar, is called the *index glass*. The purpose of the telescope is simply to sharpen the line of the horizon. In using the sextant, the operator, holding the plane of the arc vertical, looks through the telescope at the horizon glass, which is held at the point where earth and sky seem to meet. Then he moves the index arm until the image of the sun or a star, reflected in the index glass, touches the horizon line. The sun's altitude

may be read from the graduated arc.

The principle underlying the use of the sextant is a rule in optics: If an object is seen by repeated reflection from two mirrors perpendicular to the same plane, the angular distance of the object from its image is double the inclination of the mirrors. In reading the graduated arc, therefore, half degrees are taken as degrees, because what is really measured on the index is the angle between the mirrors, and this is half the angular distance between the objects. The position of the star in the celestial sphere being known, it is possible to determine the latitude of the ship by measuring the altitude of the star and comparing the altitude thus obtained with astronomical tables giving the altitude of any principal star on any particular night at various positions of latitude.

SEXTON BEETLE. See BURYING BEETLE. SEYMOUR, CHARLES (1885-), historian and educator, was born in New Haven, Conn. After 1911 he taught at Yale University and in 1937 became its president. He has served on various international commissions, including

the Paris Peace Conference in 1919.

Among his writings are Electoral Reform in England and Wales, Diplomatic Background of the War, American Diplomacy During the War, American Neutrality, 1914-1917, and The Intimate Papers of Colonel House.

SEYMOUR, JANE. See HENRY, p. 3144. SFORZANDO, sfawr tsahn' doh. See Music (A Course of Lessons).

's GRAVENHAGE. See HAGUE, THE.

SHACKAMAXON, an Indian village (now in Philadelphia) where Penn and the Indians are said to have signed their famous treaty.

SHACKLETON, SIR ERNEST (1874-1922), Antarctic explorer, was born at Kilkee, Ireland, and attended Dulwich College. In 1901 he was appointed third lieutenant of the National Antarctic Expedition, commanded by Robert F. Scott. From 1904 to 1906, he was secretary and treasurer of the Scottish Geographical Society.

Shackleton organized and equipped, with the aid of friends, a British Antarctic expedition, and landed in 1908 at Erebus Island, South Victoria Land. Mount Erebus was ascended, and one of the most remarkable sledge exploits ever recorded was undertaken over the Antarctic continent. On January 9, 1909, the party reached latitude 88° 23', a point only ninety-

seven miles from the South Pole. The elevation was 11,600 feet, and the wind and storms were of great violence; this fact, and a food shortage compelled the party to turn back. Shackleton was knighted on his return to Eng-

land, and was presented with numerous honors and medals by societies in all parts of the world. His Heart of the Antarctic tells of this trip.

Early in December, 1914, the explorer entered the ice pack in the Weddell Sea, beginning one of the most thrilling expeditions in Polar research. Shackleton returned to England in the spring of 1917 to serve in the

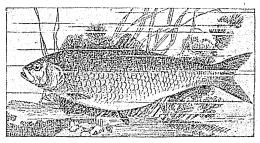


SIR ERNEST SHACKLETON

World War. He passed through the United States on his homeward journey, lecturing to large and enthusiastic audiences. He died while on his third Antarctic trip. In 1932 a memorial statue of the explorer was presented to the Royal Geographical Society, London.

Related Subjects. The reader is referred to:
Amundsen, Roald Ross, James Clark
Polar Exploration Scott, Robert Falcon

SHAD, an important food fish of the herring family. The common, or American, shad is native to the sea waters from Newfoundland to Florida, but has been introduced into the Pacific coast waters by the Bureau of Fisheries. It is primarily a sea fish, but ascends freshwater rivers to spawn, and at that time, large



THE SHAD

numbers are caught in seines or nets. Artificial propagation has kept the shad supply from extinction. The fisheries, which are operated only at spawning time, have been greatly overworked, especially those of the east-coast rivers. So-called "Potomac shad" is shipped to eastern markets from California on ice. These fish are eaten fresh, for the most part, but a few are smoked or salted in brine. Their eggs are sometimes used in making caviar

(which see), as they are the best substitute for the roe of the sturgeon. Shad average about three pounds in weight, and from two to two and one-half feet in length. They are bluish above, with silvery sides. See HERRING. L.H.

Scientific Name. The common shad is known as Alosa sapidissima.

SHADDOCK, a pear-shaped variety of grapefruit (which see).

SHADE. See Color.

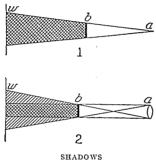
SHAD FLY. See MAY FLY.

SHADOWS, shad' ohz. When a ray of light strikes an object through which light cannot pass, that is, an opaque body, a darkened space may be seen behind the obstructing object. Such a space is known as a shadow. Shadows are formed constantly everywhere. We see shadows of clouds on meadows and on water, shadows of trees and buildings, and shadows of ourselves. The light of the sun causes

the earth to throw a huge shadow into space, and when the moon passes into this darkened area, it may be partially or completely eclipsed (see ECLIPSE).

(see ECLIPSE).

The accompanying diagram illustrates the



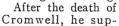
formation of shadows. In Fig. 1, the source of light is a luminous point, a. An opaque body b intercepts the ray of light from a, and the space between b and the screen w is in the shadow. As the light is totally excluded, the space is completely darkened, and an ambra is formed. In Fig. 2, a, the source of light, is an area of considerable dimensions. In this case, the space behind b consists of a totally darkened region, or umbra, and of a region where only part of the light is cut off. This latter section, in oblique shading, is the benumbra. See Light; Penumbra. Alle.

SHADWELL, THOMAS. See POET LAUREATE.

SHAFTER, WILLIAM RUFUS (1835-1906), an American soldier, distinguished for his services as commander of land operations in Cuba during the Spanish-American War. His forces, in a month's fighting, captured Santiago and the entire eastern section of the island (see Spanish-American War). Shafter was born at Galesburg, Mich. After 1866, he was in the regular service. At the close of the Spanish-American War, General Shafter commanded in turn the departments of the East and of California and Columbia. He retired in 1901 with the rank of major general.

SHAFTESBURY, ANTONY ASHLEY COOPER, first Earl of (1621-1683), an English statesman who forced the passage of the Habeas Corpus

Act. He rose to great prominence during the Commonwealth and after the restoration of Charles II. The son of John Cooper of Wimborne, Dorsetshire, he entered Parliament before his twenty-first birthday, and showed an inclination to side with the royalists. Afterward, however, he became one of the most decided supporters of Parliament, and was active against the king.





SHAFTESBURY

ported the cause of Charles II. The new king made him Baron Ashley, and shortly afterward Earl of Shaftesbury and Lord Chancellor.

He was a member of the Cabal (which see), and supported the Test Acts in favor of Protestants, for which he lost his office. Later, he was arrested for high treason, but released, and entered into further conspiracies until he had to flee to Holland, where he died.

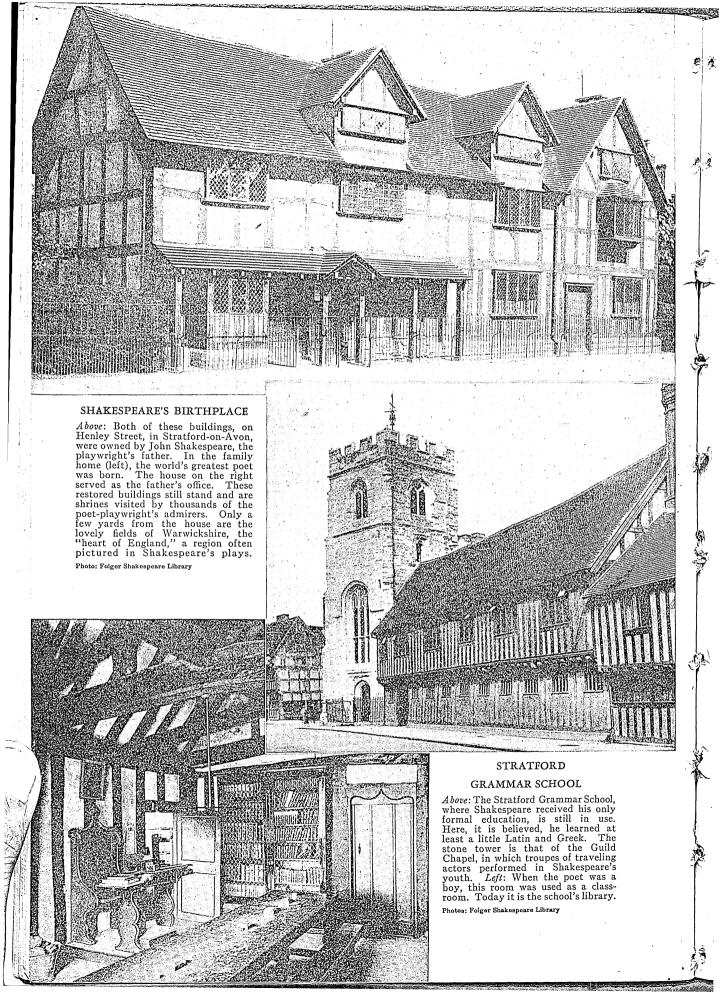
Related Subjects. The reader is referred to:
Commonwealth of England Test Acts
Habeas Corpus Restoration

SHAGREEN, shah green', the skin of the shark (which see).

SHAH JEHAN, shah je hahn' (about 1592-1666), the fifth ruler of the Mogul (or Mongol) Empire in India, famed as the builder of one of the most beautiful structures ever erected—the Taj Mahal (which see). Shah Jehan brought Mohammedan architecture in India to the height of its glory. He founded the modern city of Delhi (which see), and built the Pearl Mosque at Agra. Shah Jehan's reign of thirty years (1628-1658) was a turbulent one; eight years before his death, he was deposed by his sons. See Mongols.

SHAKERS, OR SHAKING QUAKERS, a religious sect that first appeared in England about 1747. These people were originally a branch of the Quakers, called Shakers because they shook their bodies during their religious services. One of their early leaders, Ann Lee, who claimed that she was the reincarnated Christ, settled in America, in 1774, and set up a small church near Watervliet, N. Y. In 1787 the society was made communistic, the first such United States organization.

Shakers hold many Quaker views, and, in addition, practice celibacy, hold property in common, and keep separate from the world.





SHAKESPEARE

William Egalynaca

SHAKESPEARE. William Shakespeare is usually considered the greatest dramatist the world has known and the finest poet who has written in the English language. No other writer's plays have been produced so many times in so many countries, and no poet's verse has been so widely read in so many different tongues. His works have been translated into more languages than any book in the world except the Bible. Thousands upon thousands of books and articles have been written about him and his works. One famous library has more than fifteen thousand volumes of editions of his plays and poems alone, not including the thousands published about the man and his work.

Such unequalled popularity is eloquent proof of Shakespeare's influence on millions of theatergoers and readers. The testimony of other men of letters to his greatness is no less impressive. Goethe, the great German writer, said, "I do not remember that any book or any person or event in my life ever made so great an impression on me as the plays of Shakespeare." Thomas Carlyle, the English essayist, once said, "I think the best judgment not of this country alone, but of Europe at large, is slowly pointing to the conclusion that Shakespeare is the chief of all poets hitherto; the greatest intellect who, in our recorded world, has left record of himself in the way of literature.'

Among those who have testified to the joy and wonder they have felt before Shakespeare's immortal creations are such literary giants as Milton, Dryden, Pope, Addison, Johnson, Keats, Byron, Lamb, Coleridge, Scott, Browning, Emerson, Lowell, and Whitman. So many thousands of tributes have been paid to Shakespeare by famous men of different ages and nations that several anthologies have been prepared to give samplings of them, just as anthologies of English literature are prepared for students who cannot possibly read all the good

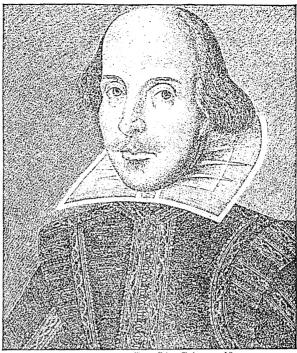


Photo: Folger Shakespeare Library

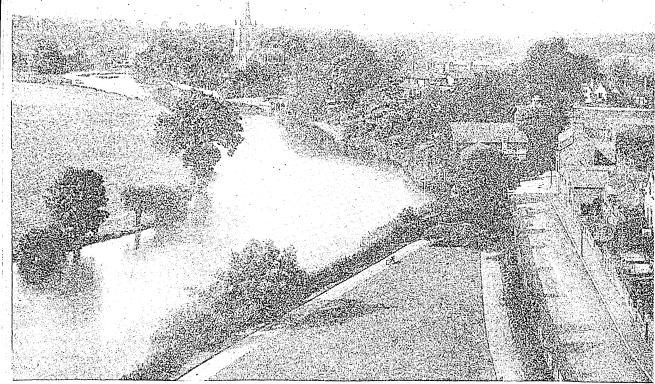
THE DROESHOUT ENGRAVING

This portrait by Martin Droeshout appeared in the first folio of Shakespeare's plays published in 1623.

English poetry and prose written since the time of Chaucer.

Oualities of His Genius. One of the reasons for Shakespeare's universal appeal is the number and variety of characters he created-people of all types, from all walks of life, so deeply understood and so vividly presented that for many readers they have become more real than the living men about them. Pickpockets and kings, country bumpkins and court ladies, drunkards, dandies, hostlers, generals, lovesick girls, and hired murderers all spring to life in his plays. To many people Hamlet, Falstaff, and King Lear are far more real than Jefferson and Napoleon. This incomparable creative power is one of the great attributes of Shakespeare's genius. It cannot be explained, but it is agreed that behind it lies a wide acquaintance with men and women of all types in the bustling London of Queen Elizabeth's day.

Another characteristic of Shakespeare is his amazing knowledge of a wide variety of subjects—music, the law, seamanship, the Bible, military science, the stage, art, politics, history, psychology, hunting, woodcraft, animal husbandry, and sports. So extensive and accurate is this knowledge that lawyers have tried to prove that Shakespeare must have been a lawyer, and sailors have contended that he must have had experience at sea. Yet his life, as far as it is known, shows no professional experience in any field other than the theater. Evidently he had a remarkable ability to pick up miscellaneous information and to use it accurately. He could listen to sailors' talk and then write a sea scene



STRATFORD-ON-AVON WHERE THE POET WAS BORN

Photo: Frith

as full of detailed information as is Scene I of The Tempest.

Influence on the English Language

Perhaps the most amazing attribute of Shakespeare's genius is his unequalled mastery of the English language. From his pen flowed with equal facility the words of kings and of thieves. Learned men, such as Prospero, and stupid yokels, like William in As You Like It, speak as they alone would speak. Many lines spoken by Shakespearean characters are such precise statements of the feeling which many men have experienced that they are quoted again and again. A large number of expressive words and phrases from the plays have passed into the language and are used today by millions of people who have no idea that Shakespeare created Such daily, unconscious tributes to Shakespeare's greatness by people who speak of "the king's English," of "catching a cold," of "disgraceful conduct," of a "foregone conclusion," of "elbowrood," or of "fair play" prove that he has made a deep impression not only on scholars, authors, and theatergoers, but also on every man, woman, and child who speaks the English language.

One of the most indelible impressions which Shakespeare has made on civilization, yet one which is usually forgotten, is his influence on the English language as it is used today. When he wrote his plays there were no English grammars or dictionaries, no universally accepted standards of spelling or grammar or pronunciation.

Well-educated men spelled the same word in different ways, and often pronounced it differently. They used grammatical forms which are not allowed today, such as "more braver," "more hotter," "perfecter," "perfectest," "as tall as me," "to who."

Just as grammar and spelling were unsettled, so too were the precise meanings of many words, and there were no English words for many concepts which are taken for granted today. New words and new expressions were being imported or invented for the English language. When the language was in such a state of development, it could be influenced for good or ill more easily than it can now. It is very fortunate that at such a time a writer with Shakespeare's brilliant gift of phrase and sensitive ear was writing plays which became popular and influential.

Many of the common present-day words which can be seen any day in the newspaper or heard over the radio, were first used by Shakespeare, so far as scholars have been able to find. He was the most successful of the word inventors of his time. From him are derived such words as suspicious, assassination, bare-faced, baseless, bump, countless, courtship, critic, critical, denote, disgraceful, dishearten, distrustful, dwindle, eventful, exposure, fitful, fretful, gloomy, hurry, impartial, inauspicious, lonely, misplaced, monumental, recall.

Even more notable than the words Shakespeare invented are the phrases or expressions he put together. His gift of coining phrases has

never been approached by any English writer. "Public haunt of men," "fortune's fool," and "pomp and circumstance" are fair samples of phrases now used without quotation marks as standard English, but they are really quotations from Shakespeare just as much as the more generally recognized long passages. A full list of these widely used phrases from the great dramatist would be too long, but some measure of the indebtedness of the English language in this regard is apparent when the number of familiar phrases which come from a single play are noted: "mind's eye," "primrose path," "to the manner born," "making night hideous," "a tale unfold," "shadow of a dream," "caviar to tale unfold," "shadow of a dream," "caviar to the general," "flesh is heir to," "mortal coil," "sicklied o'er," "glass of fashion," "out-herod Herod," "mirror up to nature," "counterfeit presentment," "flaming youth," "whet thy blunted purpose," "hoist with his own petard," "fellow of infinite jest," "ribband in the cap of youth." How much poorer the English language would be without the words and phrases which were first brought into it by this actorplaywright more than three hundred years ago!

Shakespeare's Life

In Shakespeare's time very few biographies were written, and most of those related the lives of kings. None of the literary men of the Elizabethan Age was considered important enough for a full biography until many years after his death, and writers of plays were thought to be less important than other poets. Shakespeare himself had been dead nearly a hundred years before anyone tried to write an extended account of his life. By that time many of the facts were no longer known, though miscellaneous stories about him were current, some false, some possibly true. Certain knowledge of Shakespeare's life is, therefore, very scanty, though no more scanty than for other great literary men of the period. Such facts as there are come mostly from church registers, town records, and accounts of business transactions.

Early Years. William Shakespeare was born in Stratford-on-Avon, a moderately important English market town about eighty miles northwest of London, in the year 1564. The registers of Holy Trinity, the parish church in which Shakespeare was buried fifty-two years later, record his baptism on April 26, 1564, and it is generally assumed that he was born April 23, since babies were sometimes baptized on the third day. However, there is no proof of the actual date of his birth.

The poet's father, John Shakespeare, was a fairly prosperous glover and trader in wool, hides, and grain. He owned at least five houses

in Stratford, and held various offices in the town. He became mayor when his son William was four years old. Shakespeare's mother was Mary Arden, the daughter of a landowner living near Stratford. John and Mary Shakespeare had eight children, of whom William was the third.

Nothing is known definitely of Shakespeare's boyhood in the town of Stratford, but it is highly probable, considering his father's position, that he went to the Stratford grammar school, which was free to the children of citizens of the town. In grammar schools of the time the boys studied Latin chiefly, so young William Shakespeare probably read Cicero, Virgil, Ovid, Terence, Plautus, and Seneca. After the long school day (in those days school began at six or seven in the morning and lasted until five or six in the evening) and during holidays the young Shakespeare certainly became familiar with the beautiful countryside around Stratford, as is shown by the many allusions to rural sights and sounds in his plays. Access to the country was easy for him, for his father's home in Henley Street was scarcely two hundred yards from the open fields. Sometime in his youth Shakespeare must have acquired an amazing knowledge of field sports, hunting, hawking, and woodcraft, for his plays show a fuller knowledge of sportsman's lore than do those of any other dramatist of his time. It is easy to imagine him escaping from Stratford and following the neighboring gentry as they scoured the countryside with their hawks and hounds.

Marriage. When Shakespeare was thirteen or fourteen, his father began having financial difficulties, which dogged him all his life. According to Shakespeare's first biographer (who did not write until nearly one hundred years after the poet's death) the boy was taken from school because of these difficulties, and tradition asserts that he was apprenticed to a Stratford tradesman. Though this story is likely enough, considering the status of the family and the customs of the town, there is no definite record of Shakespeare until November 27, 1582. On that date a license was issued for his marriage to Anne Hathaway, the daughter of a farmer who lived about one-half mile west of Stratford at Shottery. At the time, William was eighteen and Anne twenty-six.

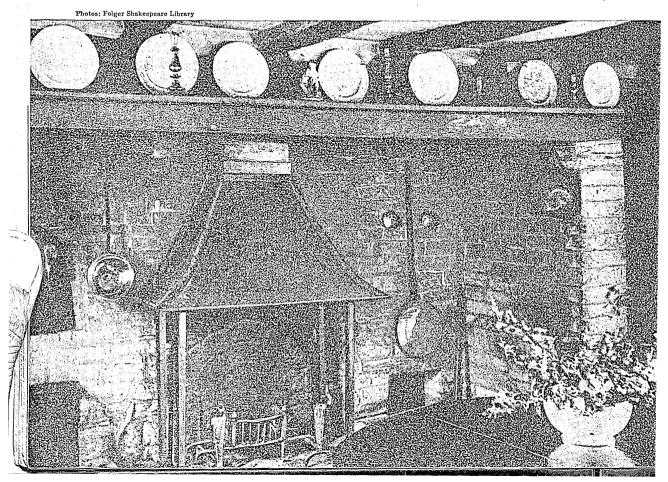
The only other definite records of William's early life in Stratford are those of the baptism of his children, Susanna on May 26, 1583, and the twins Hamnet and Judith on February 2, 1585. When or why he left Stratford is not definitely known. One story, recounted more than one century later, tells that he was caught poaching in the deer park of Sir Thomas Lucy, a justice of the peace and member of Parliament, and was prosecuted. In revenge, it is said that he wrote a scurrilous ballad on Sir Thomas, was prosecuted further, and had to leave Stratford. Another story, first recorded about one-half century after Shakespeare's death, says that he was a schoolmaster before he went to London. Actually, there is no definite evidence of what



ANN HATHAWAY'S COTTAGE

Above: This picturesque cottage is the birthplace of Ann Hathaway who became Shakespeare's wife. It is located at the village of Shottery about a mile from Stratford-on-Avon. It has half-timbered walls, a roof thatched with straw, and small dormer windows. Three chimneys rise above the roof. In front of the cottage is a typical English garden of flowers, shrubs, and vegetables. The Hathaway house, restored and still sturdy and well-preserved, is said to be the most photographed in all England. Today, it is used as a museum and is furnished much as it is thought to

have been furnished during the poet's courtship days. Thousands of tourists and admirers of Shakespeare's plays visit this simple, but world-famous cottage. Below: The living room of the Hathaway home, showing the hooded fireplace, grate, and andirons. Notice the unplastered brick walls, the warming pans hanging on either side of the fireplace, and the chinaware and candlesticks displayed on the mantel. In most houses of the day, there was a baking oven set in the wall close to the fireplace. In such ovens bread and other foods were baked for the family.



happened to him between 1584, when the twins were born, and 1592 when he was acting and writing plays in London. These years are sometimes called "the lost years."

Actor and Playwright. Evidently at some time during this period Shakespeare came to London and became a man of the theater. How his career began is not known. One legend says that he first held horses outside the theater, another that he began as a callboy, still another that he was a minor actor. All that is definitely known, however, is that by 1592 he was recognized as an actor and a playwright. In that year the brilliant but dissolute poet and dramatist, Robert Greene, wrote on his deathbed a sensational pamphlet called Greene's Groatsworth (eight cents' worth) of Wit Bought with a Million of Repentance. In it he bitterly attacked Shakespeare as an upstart actor and playwright who thought himself as good as the universitybred dramatists. Soon afterward Greene died, and the pamphlet was edited by his friend Henry Chettle, who did not know Shakespeare. Two or three months later, after meeting Shakespeare and hearing about him from various friends, Chettle published an apology, commending Shakespeare as an actor, writer, and man of "civil" demeanor, and expressing regret that he had not suppressed his envious friend's pamphlet. Greene's attack and Chettle's apology make it apparent that by the end of 1592 Shakespeare was fairly well-known in London as an actor and playwright, that he had influential friends, and that his success in the theater had been sufficient to rouse the envy of at least one of his rivals.

Poet. From the summer of 1592 to the summer of 1594, plagues and riots caused the London theaters to be closed most of the time, so Shakespeare turned to writing nondramatic verse. During this period, he published two long narrative poems, Venus and Adonis and The Rape of Lucrece, both of which became very popular and added tremendously to his reputation. They were his first works to be published and thus to reach an audience which could not or would not frequent the popular London theaters. Moreover, in the eyes of many Englishmen of the 1500's, plays had little more claim to literary distinction than motion-picture scenarios do today. Shakespeare himself was probably not entirely free from this curious prejudice, for Venus and Adonis and Lucrece were the only works whose publication he carefully supervised himself, and the only ones for which he wrote dedications. Both are dedicated to Henry Wriothesley, Earl of Southampton, who, because of this fact, is frequently spoken of as Shakespeare's patron.

Theater Companies. It is not known definitely to what particular theatrical company Shakespeare belonged in the years preceding 1504. Plays in Shakespeare's time were performed by permanent repertory companies, with the same cast of men and boys presenting a variety of plays in the same theater week after week. These groups were commercial organizations dependent for their income on the admissions paid by the audiences. The group to which Shakespeare belonged from 1594 to the end of his career was called the Lord Chamberlain's Company until King James came to the throne in 1603; thereafter it had the honor of the patronage of the King himself and was known as the King's Company. Shakespeare was one of the leaders and stockholders in this organization, which became the most prosperous theatrical troupe in London. His income, obviously quite a respectable one in the latter part of his life, was presumably derived from his share in the profits, for in his time no dramatist received very much money from the sale of either the acting or publishing rights to his plays and poems.

Financial Success. That Shakespeare made a modest fortune is shown by various records. In 1596 he owned enough property in the London parish of St. Helen's, Bishopsgate, to have his taxes assessed at five pounds, a large sum in those days. The next year he bought one of the finest houses in Stratford and improved it and the grounds until it became one of the show places of the town. It had ten fireplaces and, after his death, while his daughter was living there, it was selected as the residence of James the First's Queen during her visit to Stratford for a few days. In 1598 he bought 10 per cent of the stock in the handsome Globe Theater and, ten years later, 14 per cent of the stock in the Blackfriars Theater. In 1602 he bought one hundred acres of land near Stratford and leased a cottage and another plot of ground in the town. Three years later he purchased valuable rents in the town of Stratford, and in 1613 another house in a fashionable section of London. All these real estate transactions are of little significance in themselves, but, taken together, they demonstrate the prosperity which Shakespeare attained through his theatrical activities.

From 1594 to about 1608 were the most productive years of Shakespeare's career. Though he must have been a familiar figure about London, only a few records of his specific activities have survived. In 1596, probably upon the application of the dramatist, the College of Heralds granted his father a coat of arms. This consisted of a gold shield bearing a silver falcon shaking a golden spear.

Activities. In the same ear a man named William Wayte claimed that Shakespeare and certain other men had put him in fear of death. Of this particular controversy little is known except that it was part of a long wrangle in which Shakespeare was not primarily involved. In 1598 and 1603 Shakespeare acted in two of

Lines Associated with Famous Shakespearean Characters

Lines	CHARACTER	Source
Lord, what fools these mortals be!	Puck	A Midsummer Night's Dream Act III, Sc. 2, 115
Benedick, the married man	Benedick (spoken by Don Pedro)	Much Ado about Nothing Act, V, Sc. 4, 99
O that I had been writ down an ass!	Dogberry	Much Ado about Nothing Act IV, Sc. 2, 90
Just as high as my heart	Rosalind	As You Like It Act III, Sc. 2, 284
An ill-favour'd thing, sir, but mine own	Touchstone	As You Like It Act V, Sc. 4, 60
Neither a borrower nor a lender be	Polonius	Hamlet Act I, Sc. 3, 75
To be, or not to be—that is the question	Hamlet	Hamlet Act III, Sc. 1, 56
Frailty, thy name is woman!	Gertrude (spoken by Hamlet)	Hamlet Act I, Sc. 2, 146
This was the noblest Roman of them all	Brutus (spoken by Antony)	Julius Caesar Act V, Sc. 5, 68
He doth bestride the narrow world like a Colossus	Julius Caesar (spoken by Cassius)	Julius Caesar Act I, Sc. 2, 135
One that lov'd not wisely, but too well	Othello	Othello Act V, Sc. 2, 344
Her voice was ever soft, Gentle, and low—an excellent thing in woman	Cordelia (spoken by Lear)	King Lear Act V, Sc. 3, 272-273
A snapper-up of unconsidered trifles	Autolycus	The Winter's Tale Act IV, Sc. 3, 26
ge cannot wither her nor custom stale crinfinite variety Cleopatra (spoken by Enobarbus)		Antony and Cleopatra Act II, Sc. 2, 240
A horse! a horse! my kingdom for a horse!	King Richard III	King Richard III Act V, Sc. 4, 7
A pair of star-cross'd lovers	Romeo and Juliet (spoken by the chorus)	Romeo and Juliet Prologue, 6
For God's sake let us sit upon the ground And tell sad stories of the death of kings!	King Richard II	King Richard II Act III, Sc. 2, 155-156
Screw your courage to the sticking place	Lady Macbeth	Macbeth Act I, Sc. 7, 60
I am not only witty in myself, but the cause that wit is in other men	Falstaff	King Henry IV, Part II Act I, Sc. 2, 11
Had I but serv'd my God with half the zeal I serv'd my king, he would not in mine age Have left me naked to mine enemies	Wolsey	King Henry VIII Act III, Sc. 2, 455-457
[A] pound of flesh	Shylock	The Merchant of Venice Act IV, Sc. 1, 99

Ben Jonson's plays which were produced by his company. With his fellow actors, he marched in King James's royal entrance parade into London in 1604. Between 1602 and 1612 he was a fairly close friend of a family of French refugees named Mountjoy, and during some part of this period he lived in their house. When Mary Mountjoy's husband sued her father about Mary's dowry in 1612, Shakespeare, then living at Stratford, was called as a witness and told what he remembered of the arrangements for the marriage.

These few fragmentary records give no real picture of Shakespeare's activities in London; they are merely incidental facts which chance to have been preserved for more than three centuries. Shakespeare's time was chiefly occupied with affairs of the theater. In addition to the tremendous labor of writing his own plays, he was regularly acting in the company's performances and rewriting and revising old plays. He must have been extremely busy—rehearsing in the mornings, acting in the afternoons, writing and revising plays at night and in odd hours, and attending to his various business affairs whenever he could. It has been suggested that this severe strain led to some kind of breakdown in 1608, and there is evidence that Shakespeare's activities changed in that year. Before then, he seems to have furnished his company with about two plays a year, but after that date not more than five plays can be attributed to him in the seven years before his death, and two or three of them are collaborations.

Later Years. Shakespeare's company, acquired the fashionable Blackfriars Theater in 1608 and from then on performed there in the winter and at The Globe during the summer. Thereafter, Shakespeare probably retired more and more from regular acting and writing for the company. After 1612 he seems to have spent most of his time in Stratford, though he was back in London now and again-perhaps in 1613 when The Globe burned during a performance of his Henry VIII. Certainly he had stock in the new Globe which was built imme-

diately on the site of the old.

During his last illness, Shakespeare was at Stratford. On March 25, 1616, he called in his lawyer, Francis Collins, to revise his will, in which he remembered various friends, including his old fellow actors of the King's Company in London, John Heminges, Henry Condell, and Richard Burbage, and his Stratford neighbors such as Hamlet Sadler and John Nashe. As was usual at the time, he tried to keep most of his property together to form an estate for his direct descendants, in his case the children of his two daughters. Again, like most Englishmen of the day, he liked to think that his property would serve his descendants for generations. In this, however, he failed, for all his grandchildren died childless, and his last direct descendant passed away in the year 1670.

Shakespeare himself died at the age of fiftytwo, on April 23, 1616, about a month after he revised his will. As a prominent citizen of the town, he was buried inside the chancel of Holy Trinity Church. On the flat stone over his grave were carved the lines sometimes described as his epitaph, but which are nothing of the kind. They are simply a device to prevent the desecration of the grave. In English churches, where people were buried under the floor of the church year after year for centuries, it is easy to understand how the space was sooner or later filled. When it was, the sexton removed the bones of those who had long since been forgotten and tossed them unceremoniously into the charnel house where dead bodies and bones were kept. (The one at Stratford opened off the north side of the chancel, only a few feet from Shakespeare's grave.) New burials were then made in the space thus made available. Evidently Shakespeare, like others, was distressed by this practice, for the lines carved on his gravestone are nicely designed to prevent

GOOD FREND FOR ESVS SAKE FORBEARE, TO DIGG THE DYST ENCLOASED HEARES BLESE BE Y MAN & SPARES HES STONES. AND CURST BE HE Y MOVES MY BONES.

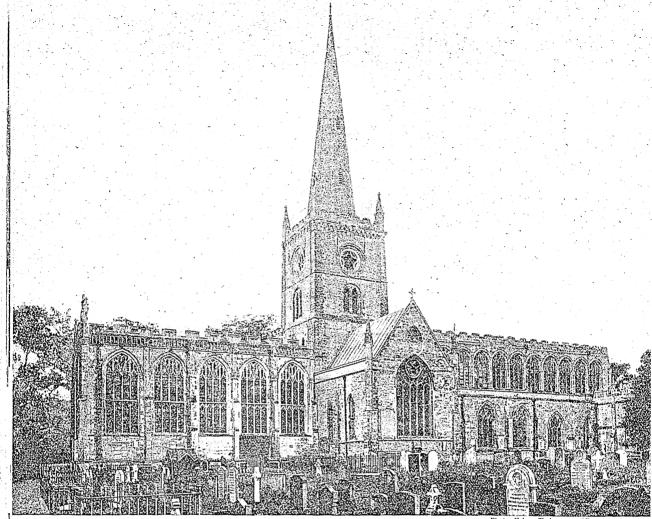
THE LINES CARVED ON SHAKESPEARE'S GRAVESTONE

any superstitious sexton from disturbing the grave.

Portraits. Some time before 1623 a bust of the dramatist was placed on the wall of the church. Since it was made after his death by a London tombmaker named Johnson or Janssen, and not by a sculptor, there is no reason to think that it is a good likeness. The bestknown portrait of the playwright is the engraving by Martin Droeshout, which appeared in the first folio of Shakespeare's plays in 1623. Since Droeshout was only fifteen years old when the poet died and Shakespeare could not have sat for the portrait, there can be no complete confidence in its fidelity. There is even some evidence that Droeshout made use of the Stratford bust in preparing his engraving. Nevertheless, unsatisfactory as the bust and the engraving are, they are the most authentic likenesses of Shakespeare available.

Besides these two, many alleged portraits of Shakespeare have turned up from time to time, but all are dubious. In some cases there is no evidence that they were ever intended to be portraits of Shakespeare; they are simply pictures of unknown men of the time. Others were painted after Shakespeare's death, but not by men such as Droeshout or Johnson, known to have been hired by Shakespeare's heirs and

friends.



HOLY TRINITY CHURCH

Here the "Bard of Avon" was baptized and now lies buried with his wife and other members of the family.

Shakespeare's Works

As a professional dramatist deriving his income directly from the theater, and associating daily with actors, Shakespeare wrote his plays to suit the tastes of the popular audience. He was not an innovator; he did not introduce new types of plays as did Thomas Kyd, Christopher Marlowe, or Ben Jonson. He wrote to meet the demands of the actors for plays of a type already popular. Nine of his ten historical dramas were written during a period when such plays were in greatest vogue; all six of his greatest tragedies were written when tragedy was most popular; his dramatic romances or tragicomedies were completed when plays of that type were succeeding on the stage. Like so many artists of the greatest genius, he was content to meet the demands of his time. He exercised his genius not in creating new forms but in exploiting to the fullest the possibilities of whatever form was in vogue.

Periods of Development. In studying the work of any great artist-painter, sculptor, musician, or writer—his admirers always want to

know the order in which his works were created so that they may observe the development of his genius. Scholars have long tried to ascertain the dates of Shakespeare's plays so that they might study the development of his genius. Though they have not yet attained complete success, it is now possible to be reasonably sure of the approximate dates of most of them. There were four major periods in Shakespeare's development, the first beginning with his arrival in London and continuing until about 1594 or 1595. The second period lasted until about 1600 or 1601; the third until 1608; and the last until he gave up writing for the stage three or four years before his death.

The first period was definitely one of experimentation. Several of the plays are revisions of other men's work; all contain experiments in verse forms, in types of situations, and in kinds of dramatic appeal.

The plays of the first period are of various types—tragedy, comedy, history, and farce.

During the second period, Shakespeare used the tools of the playwright and poet much more

The First Period

	The Fire	st Period	
PROBABLE DATE OF FIRST	·	DATE OF	
ERFORMANCE*	TITLE	PUBLICATION	CHIEF SOURCE
1591	Henry the Sixth, II	1594	Holinshed, Chronicles
1591	Henry the Sixth, III	1595	Holinshed, Chronicles
1592	Henry the Sixth, I	1623	Holinshed, Chronicles
1592	The Comedy of Errors	1623	Plautus, Menaechmi and Amphitruo
1592	Titus Andronicus	1594	An early Italian History of Titus
1593	Richard the Third	1597	Holinshed, Chronicles
1593	Love's Labour's Lost	1598	Unknown
1594	The Taming of the Shrew	1623	Anon., The Taming of a Shrew
1594	The Two Gentlemen of Verona	1623	Montemayor, Diana Enamorada
	The Seco	ond Period	
	D J. Tuli 4		Process The Transital Historical
1595	Romeo and Juliet	1597	Brooke, The Tragicall Historye of Romeus and Juliet
1595	Richard the Second	1597	Holinshed, Chronicles
1595	A Midsummer Night's Dream	1600	No single comprehensive source
1596	King John	1622	Anon., The Troublesome Reign of John King of England
1596	The Merchant of Venice	1600	Fiorentino, Il Pecorone
1597	Henry the Fourth, I	1598	Holinshed, Chronicles, an old play Th Famous Victories of Henry V
1597-98	The Merry Wives of Windsor	1602	Unknown
1598	Henry the Fourth, II	1600	Holinshed, Chronicles and The Famou Victories of Henry V
1598-99	Much Ado About Nothing	1600	Belleforest, Histoires Tragiques; Arios to, Orlando Furioso, Canto V
1599	Henry the Fifth	1600	Holinshed, Chronicles
1599	Julius Caesar	1623	Plutarch, Lives
1599	As You Like It	1623	Lodge, Rosalynde
1600-01	Twelfth Night	1623	Riche, Farewell to the Military Pro
	The Thi	rd Period	
1600-01	Hamlet	1603	The early play of <i>Hamlet</i> ; Belleforest Histoires Tragiques
1602	Troilus and Cressida	1609	Various popular medieval accounts o
	All's Well that Ends Well	7600	the story of Troy Painter, Palace of Pleasure
1602	Measure for Measure	1623	Whetstone, Promos and Cassandra
1604		1623	,
1604 1605-06	Othello King Lear	1622 1608	Cinthio, Hecatommithi Anon., Chronicle History of King Lear various popular accounts, and Sid
			ney's Arcadia
*606	Macbeth	1623	Holinshed, Chronicles
1606 1607	Antony and Cleopatra	1623	Plutarch, Lives
·	Coriolanus	1623	Plutarch, Lives
1608 1608	Timon of Athens	1623	Plutarch, Lives; Lucian, Timon
	The Fou	rth Period	
	Inc roa		
1608	Pericles	1609	Gower, Confessio Amantis
1609-10	Cymbeline	1623	Boccaccio, Decameron; Holinshed, Chronicles
1611	The Winter's Tale	1623	Greene, Pandosto
1611	The Tempest	1623	No comprehensive source
1613	Henry the Eighth	1623	Holinshed, Chronicles; Foxe. Book of

surely. He seldom failed to attain the effect desired, and he confined himself mostly to light comedies and histories.

In the third period of his development all his greatest tragedies were written—Hamlet, Othello, King Lear, Macbeth, Antony and Cleopatra, and Coriolanus—as well as the "bitter comedies" or "problem comedies." This is the period of his most mature work: his purpose is deeply serious; his characters are the most profound and subtle creations ever seen on any stage; his blank verse and prose are forged into the most effective dramatic instrument ever created. No other writer has produced in a short period of seven or eight years so many works which may truly be called masterpieces.

The fourth period of Shakespeare's work contains the smallest number of plays and shows a sharp falling off in dramatic intensity. The most representative plays of this period are the so-called dramatic romances or tragicomedies: The Tempest, The Winter's Tale, and Cymbeline. They combine something of the lightness of As You Like It and Twelfth Night with more serious situations. In them Shakespeare is still the dramatic master and great poet, but though he seems more eager than ever to pack his lines with meaning, something of his earlier zest is gone.

Types of Plays. In general, Shakespeare's plays fall into three classes, as was indicated in the first collected edition, the folio of 1623, which was entitled *Mr. William Shakespeare's*

Comedies, Histories, and Tragedies.

Histories. The histories, sometimes called chronicle plays, are the type least familiar today, for they long ago ceased to be written. They were, however, very popular in Shakespeare's time, more than one hundred and fifty of them having appeared, nearly one third of Shakespeare's own plays being written in this form. They were not simply delineations of heroic figures seen against historic or "period" backgrounds, as the modern Abe Lincoln in Illinois. Rather, they were plays in which the history came first. Their aim was to satisfy the demand of the London audience for stories about the past; they were really "pieces out of the story of England dramatized and set on the stage." The audience wanted to see not simply a play with a great king like Henry V in it, but a portrayal of what had actually happened when Henry V was king. Thus the chronicle plays tended to include all the well-known events of a reign for the delight of an historical-minded audience. Furthermore, all such plays assumed that the audience had a fair knowledge of English history. For this reason, some of the action is not readily understood by the average modern reader.

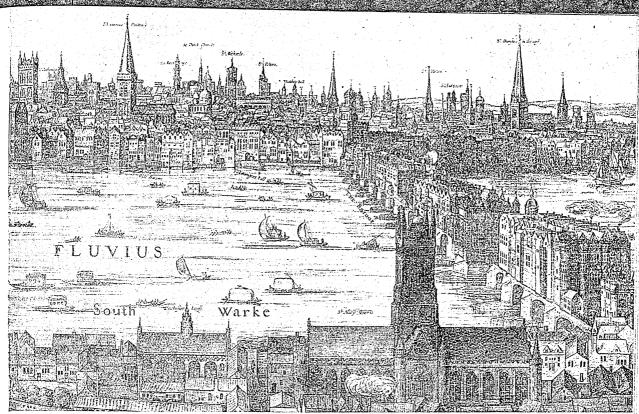
The Elizabethan historical plays deal with most periods of English history from 950 to 1603, but Shakespeare was interested particularly in one century of his country's history, the period from about 1390 to 1485. Eight of his ten historical plays are concerned with this period, and treat the reigns of seven successive kings of England—Richard II, Henry IV, Henry V, Henry VI, Edward IV, Edward V, and Richard III.

Tragedies. Shakespeare's tragedies belong to a type of play much more familiar today, for not only is tragedy still regularly performed in our theaters, but most modern tragedies have also been decidedly influenced by Shakespeare. Confusion about his tragedies occasionally arises because it is easy to forget that the Elizabethans made no distinction between tragedy and melodrama. In those days, any play which involved catastrophes and violent death was called a tragedy, regardless of how superficial or melodramatic it was. Thus Shakespeare's Titus Andronicus was called a tragedy, although it would be labeled melodrama today.

Comedies. Shakespeare's comedies have greater variety than his histories and tragedies. Most familiar are As You Like It, Twelfth Night, and A Midsummer Night's Dream, light romantic pieces highly fanciful and improbable in plot. He also wrote plays which would now be called farces, although the term was not in common use in Elizabethan England. Among these are The Comedy of Errors and The Taming of the Shrew. Somewhat similar is The Merry Wives of Windsor, a popular comedy with a large element of farce, a play which would probably be advertised as a farce-comedy if it had been written for the modern stage. Least familiar to most readers are Shakespeare's bitter comedies or problem comedies—All's Well that Ends Well, Measure for Measure, and Troilus and Cressida. These plays, cynical, mirthless, inconclusive, and unsatisfactory in their endings, are the most puzzling of Shakespeare's dramatic works. Still later in his career came the romances or tragicomedies-The Tempest, The Winter's Tale, and Cymbeline, each a mixture of romance, melodrama, and near-tragedy.

Plots. Regardless of type, most of Shakespeare's plays have plots based upon his own reading of history or fiction. The Elizabethan custom of using old plots instead of inventing new ones often puzzles modern readers who are inclined to consider the plot of a play its essential element. Actually most of the world's greatest dramatists, such as Aeschylus, Sophocles, Euripides, Shakespeare, and Racine, have used second-hand plots. Even in modern times, dramatists like Eugene O'Neill and Maxwell Anderson sometimes deliberately call attention to the fact that their plots are not original. In all ages, the great dramatists portray the eternal realities in the struggles of men with circumstances or fate. To them, plot orig-

inality is of little importance.



OLD LONDON BRIDGE

Photo: Folger Shakespeare Library

Theater-going Londoners of Shakespeare's day crossed London Bridge on their way to the theater district when they did not cross the river by boat. The dwelling houses were later torn down when the bridge became unsafe.

In his search for stories and ideas for effective plays, Shakespeare used a number of widely read books of his time. Chief of these were a popular history written by Raphael Holinshed called *Chronicles of England, Scotland, and Ireland* and Lord North's translation of *The Parallel Lives of the Noble Grecians and Romans* by Plutarch.

Characters. Whatever the source of his plot, Shakespeare makes the material completely his own, adding, omitting, and changing, until the original source is no more than a fragmentary skeleton about which he has formed a living work of art. This is especially true of his great characters, as Shylock, Falstaff, Macbeth, Hamlet, Rosalind, Richard II, Beatrice, Brutus, King Lear, Mark Antony, and Iago. In every case Shakespeare's imagination has created a living man or woman from the dry bones found in the source. So vivid are these characters in the minds of educated people that their names have become symbols for types of people and ideas. People speak of "Falstaffian humor," of a confirmed bachelor as "a Benedick," of a vicious money-grubber as "a Shylock," of a youthful lover as a "young Romeo," and of a small-town policeman as "the local Dogberry."

Famous Quotations

Not only the names of the characters but many of their speeches have passed into general usage. So accurately do these speeches express

the thoughts and feelings of men and women born long after Shakespeare's day, that they have become familiar quotations. Shakespeare is endlessly quoted by writers and speakers of all sorts and in various circumstances. Newspaper editorials are headed by such quotations; politicians and public speakers use his words constantly; books carry his lines on their title pages; and novels and plays are given titles taken from his works. Not long ago seven different books appeared, each with a title taken from one short speech in *Macbeth*. No other writer in the world is so frequently quoted. A standard book of familiar quotations gives five times as much space to Shakespeare as to the next most widely quoted author. Among the most frequently repeated of the lines spoken by Shakespeare's characters are these:

Now is the winter of our discontent Made glorious summer by this sun of York.

King Richard III. Act I, Sc. 1, 1-2

I have no other but a woman's reason: I think him so because I think him so.

Two Gentlemen of Verona. Act I, Sc. 2, 23-24

He jests at scars that never felt a wound.

Romeo and Juliet. Act II, Sc. 2, 1

What's in a name? That which we call a rose By any other name would smell as sweet.

Romeo and Juliet. Act II, Sc. 2, 43-44

Romeo. Courage, man. The hurt cannot be much. Mercutio. No, 'tis not so deep as a well, nor so wide as a church door; but 'tis enough, 'twill serve. Romeo and Juliet. Act III, Sc. 1, 98-101

A plague o' both your houses! Romeo and Juliet. Act III, Sc. 1, 103

This royal throne of kings, this scept'red isle, This earth of majesty, this seat of Mars, This other Eden, demi-paradise, This fortress built by Nature for herself Against infection and the hand of war, This happy breed of men, this little world, This precious stone set in the silver sea, Which serves it in the office of a wall, Or as a moat defensive to a house, Against the envy of less happier lands; This blessed plot, this earth, this realm, this England. King Richard II. Act II, Sc. 1, 40-50

I see thy glory, like a shooting star, Fall to the base earth from the firmament. King Richard II. Act II, Sc. 4, 19-20

For aught that I could ever read. Could ever hear by tale or history. The course of true love never did run smooth. A Midsummer Night's Dream Act I, Sc. 1, 132-134

Life is as tedious as a twice-told tale Vexing the dull ear of a drowsy man. King John. Act III, Sc. 4, 108-100

Come the three corners of the world in arms, And we shall shock them. Naught shall make us rue If England to itself do rest but true. King John. Act V, Sc. 7, 116-118

I hold the world but as the world, Gratiano-A stage, where every man must play a part, And mine a sad one.

The Merchant of Venice. Act I, Sc. 1, 77-79

I am Sir Oracle.

And when I ope my lips, let no dog bark! The Merchant of Venice. Act I, Sc. 1, 93-94

God made him, and therefore let him pass for a man. The Merchant of Venice. Act I, Sc. 2, 60-61

The devil can cite Scripture for his purpose. The Merchant of Venice. Act I, Sc. 3, 99

The quality of mercy is not strain'd; It droppeth as the gentle rain from heaven Upon the place beneath. It is twice blest-It blesseth him that gives, and him that takes. The Merchant of Venice. Act IV, Sc. 1, 184-187

How far that little candle throws his beams! So shines a good deed in a naughty world. The Merchant of Venice. Act V, Sc. 1, 00-01

By heaven, methinks it were an easy leap To pluck bright honour from the pale-fac'd moon, Or dive into the bottom of the deep, Where fathom-line could never touch the ground, And pluck up drowned honour by the locks. Henry IV, Part I. Act I, Sc. 3, 201-205

Uneasy lies the head that wears a crown. Henry IV, Part II. Act III, Sc. 1, 31

Every one can master a grief but he that has it. Much Ado about Nothing. Act III, Sc. 2, 28-29

Let me have men about me that are fat, Sleek-headed men, and such as sleep a-nights. Yond Cassius has a lean and hungry look. He thinks too much. Such men are dangerous. Julius Caesar. Act I, Sc. 2, 192-195

For there was never yet philosopher That could endure the toothache patiently. Much Ado about Nothing. Act V, Sc. 1, 35-36

Men at some time are masters of their fates. The fault, dear Brutus, is not in our stars, But in ourselves, that we are underlings. Julius Caesar. Act I, Sc. 2, 130-141

Cowards die many times before their deaths; The valiant never taste of death but once. Julius Caesar. Act II, Sc. 2, 32-33

There is a tide in the affairs of men Which, taken at the flood, leads on to fortune; Omitted, all the voyage of their life Is bound in shallows and in miseries. Julius Caesar. Act IV, Sc. 3, 218-221

His life was gentle, and the elements So mix'd in him that Nature might stand up And say to all the world, "This was a man!" Julius Caesar. Act V, Sc. 5, 73-75

O, how full of briers is this working-day world! As You Like It. Act I, Sc. 3, 12

Sweet are the uses of adversity, Which, like the toad, ugly and venomous, Wears yet a precious jewel in his head; And this our life, exempt from public haunt, Finds tongues in trees, books in the running brooks, Sermons in stones, and good in everything. As You Like It. Act II, Sc. 1, 12-17

Ay, now am I in Arden, the more fool I! When I was at home, I was in a better place; but travellers must be content. As You Like It. Act II, Sc. 4, 16-18

I shall ne'er be ware of mine own wit till I break my shins against it. As You Like It. Act II, Sc. 4, 59-60

If ladies be but young and fair, They have the gift to know it.

As You Like It. Act II, Sc. 7, 37-38 True is it that we have seen better days. As You Like It. Act II, Sc. 7, 120

All the world's a stage, And all the men and women merely players. They have their exits and their entrances, And one man in his time plays many parts.

As You Like It. Act II, Sc. 7, 139-142 I had rather have a fool to make me merry than experience to make me sad.

As You Like It. Act IV, Sc. 1, 28-29

The Illustrations

Most of the illustrations in this article, taken from books published before 1641, were selected for the World Book Encyclopedia with the assistance of the Folger Shakespeare Library, Washington, D. C.



Photo: Folger Shakespeare Library
AN ELIZABETHAN FEAST

In Shakespeare's day, tableware was much more simple than it is today. Although knives were common, there were no forks, and even spoons were a luxury. Because everyone at the table ate from the serving dishes, individual plates were unnecessary. The serving woman in the foreground is "mulling" ale over a fireplace.

Men have died from time to time, and worms have eaten them, but not for love.

As You Like It. Act IV, Sc. 1, 107-108

How bitter a thing it is to look into happiness through another man's eyes!

As You Like It. Act V, Sc. 2, 48-40

Your "If" is the only peacemaker. Much virtue in "If."

As You Like It. Act V, Sc. 4, 108

If music be the food of love, play on, Give me excess of it, that, surfeiting, The appetite may sicken, and so die.

Twelfth Night. Act I, Sc. 1, 1-3

Dost thou think, because thou art virtuous, there shall be no more cakes and ale?

Twelfth Night. Act II, Sc. 3, 123-125

She never told her love, But let concealment, like a worm i' th' bud, Feed on her damask cheek. She pin'd in thought; And, with a green and yellow melancholy, She sat like Patience on a monument, Smiling at grief.

Twelfth Night. Act II, Sc. 4, 112-118

Some are born great, some achieve greatness, and some have greatness thrust upon 'em.

Twelfth Night. Act II, Sc. 5, 157-158

O that this too too solid flesh would melt, Thaw, and resolve itself into a dew! Or that the Everlasting had not fix'd His canon 'gainst self-slaughter! O God! God! How weary, stale, flat, and unprofitable Seem to me all the uses of this world!

Hamlet. Act I, Sc. 2, 129-134

Neither a borrower nor a lender be; For loan oft loses both itself and friend, And borrowing dulls the edge of husbandry. Hamlet. Act I, Sc. 3, 75-77

This above all—to thine own self be true, And it must follow, as the night the day, Thou canst not then be false to any man. Hamlet. Act I, Sc. 3, 78-80

There are more things in heaven and earth, Horatio, Than are dreamt of in your philosophy.

Hamlet. Act I, Sc. 5, 166-167

The time is out of joint. O cursed spite That ever I was born to set it right!

Hamlet. Act I, Sc. 5, 189-190

Ay, every inch a king!

King Lear. Act IV, Sc. 6, 109

Sleep that knits up the ravell'd sleave of care.

Macbeth. Act II, Sc. 2, 37

Tomorrow, and tomorrow, and tomorrow Creeps in this petty pace from day to day To the last syllable of recorded time; And all our yesterdays have lighted fools The way to dusty death. Out, out, brief candle! Life's but a walking shadow, a poor player, That struts and frets his hour upon the stage And then is heard no more. It is a tale Told by an idiot, full of sound and fury, Signifying nothing.

Macbeth. Act V, Sc. 5, 19-28

There's beggary in the love that can be reckon'd.

Antony and Cleopatra. Act I, Sc. 1, 15

In nature's infinite book of secrecy A little I can read.

Antony and Cleopatra. Act I, Sc. 2, 9-10

To be, or not to be—that is the question: Whether 'tis nobler in the mind to suffer The slings and arrows of outrageous fortune Or to take arms against a sea of troubles, And by opposing end them. To die-to sleep No more; and by a sleep to say we end The heartache, and the thousand natural shocks That flesh is heir to. 'Tis a consummation Devoutly to be wish'd. To die-to sleep. To sleep-perchance to dream: ay, there's the rub! For in that sleep of death what dreams may come When we have shuffled off this mortal coil, Must give us pause. There's the respect That makes calamity of so long life. For who would bear the whips and scorns of time, Th' oppressor's wrong, the proud man's contumely, The pangs of despis'd love, the law's delay, The insolence of office, and the spurns That patient merit of th'unworthy takes, When he himself might his quietus make With a bare bodkin? Who would these fardels bear, To grunt and sweat under a weary life, But that the dread of something after death-The undiscover'd country, from whose bourn No traveller returns—puzzles the will, And makes us rather bear those ills we have Than fly to others that we know not of? Hamlet. Act III, Sc. 1, 56-82

Age cannot wither her nor custom stale Her infinite variety.

Antony and Cleopatra. Act II, Sc. 2, 240-241

Golden lads and girls all must, As chimney-sweepers, come to dust. Cymbeline. Act IV, Sc. 2, 262-263

We are such stuff As dreams are made on, and our little life Is rounded with a sleep.

The Tempest. Act IV, Sc. 1, 156-158

There's a divinity that shapes our ends, Rough-hew them how we will.

Hamlet. Act V, Sc. 2, 10-11

The rest is silence.

Hamlet. Act V, Sc. 2, 369

O, what a world of vile ill-favour'd faults Looks handsome in three hundred pounds a year! The Merry Wives of Windsor. Act III, Sc. 4, 32-33

One touch of nature makes the whole world kin.

Troilus and Cressida. Act III, Sc. 3, 175

Oft expectation fails, and most oft there Where most it promises.

All's Well that Ends Well. Act II, Sc. 1, 145-146

Reputation, reputation, reputation! O, I have lost my reputation! I have lost the immortal part of myself, and what remains is bestial.

Othello. Act II, Sc. 3, 262-264

O God, that men should put an enemy in their mouths to steal away their brains!

Othello. Act II, Sc. 3, 291-292

Good name in man and woman, dear my lord,
Is the immediate jewel of their souls.
Who steals my purse steals trash; 'tis something,
nothing;

'Twas mine, 'tis his, and has been slave to thousands; But he that filches from me my good name Robs me of that which not enriches him And makes me poor indeed.

Othello. Act III, Sc. 3, 155-161

Then must you speak Of one that lov'd not wisely, but too well; Of one not easily jealous, but, being wrought, Perplex'd in the extreme; of one whose hand (Like the base Indian) threw a pearl away Richer than all his tribe.

Othello. Act V, Sc. 2, 343-348

How sharper than a serpent's tooth it is To have a thankless child!

King Lear. Act I, Sc. 4, 310-311

Nondramatic Works

Narrative Poems. Besides his plays, for which he is most famous, Shakespeare left several nondramatic pieces. The first of these were the two long narrative poems, *Venus and Adonis* and *The Rape of Lucrece*.

Venus and Adonis recounts the story of Venus' courtship of the indifferent Adonis. Though the poem is no longer widely read, it was one of Shakespeare's most popular compositions in his time, going through more editions in his lifetime than any of his plays. To modern readers one of its most attractive characteristics is the beautifully wrought setting of English fields and woods.

Although The Rape of Lucrece is a more serious piece of work than its predecessor, it is not much more widely read today. In it is told the familiar story of the attack on the Roman matron Lucrece by Tarquin, and her subsequent suicide. The story itself is less significant than Shakespeare's interest in the conflict in the mind of Tarquin and in the deep anguish of Lucrece.

Sonnets. By far the best and most famous of Shakespeare's nondramatic works are his Sonnets. They were probably composed long before they were published in 1609, for they are referred to in 1598, and two of them were published in 1599. Like Venus and Adonis and The Rape of Lucrece and most of his plays, the sonnets represent a literary form in vogue during the reign of Queen Elizabeth. Numerous contemporary English poets, such as Edmund Spenser, Philip Sidney, Samuel Daniel, and Michael Drayton had written sonnet cycles long series of sonnets generally treating various phases of the poet's love for his mistress. Shakespeare followed them in writing his series of 154 sonnets, but his do not form a real cycle, for they deal with more than a single subject. Most of them are written to a young man, probably a nobleman and a cherished friend of the poet. They treat a number of subjects, including a dark lady with whom Shakespeare is in love, but who is unfaithful; a rival poet; advice to the friend to marry; affection for his friend; his long absence (presumably when Shakespeare was traveling with his company on the road); and especially they treat of Time and its ravages.

Since there is such world-wide interest in Shakespeare, many attempts have been made to identify the people he mentioned in the sonnets—the dark lady, the rival poet, and the patron and friend. None of these has been successful, although the dedications of *Venus and Adonis* and *The Rape of Lucrece* to the Earl of Southampton makes it possible that he was the friend and patron whom Shakespeare addressed.

Inability to identify the people of whom Shakespeare speaks in no way affects the greatness of the sonnets as poetry. No other sonnets in the English language are so beautifully wrought or so deeply moving; no poet has fitted his ideas into the strict sonnet form so effortlessly. In reading the finest of the sonnets, such as the seventy-third, one is almost persuaded that the ideas actually came to the poet in sonnet form, so easily does he meet the structural requirements.

That time of year thou mayst in me behold When yellow leaves, or none, or few, do hang Upon those boughs which shake against the cold, Bare ruin'd choirs, where late the sweet birds sang. In me thou see'st the twilight of such day As after sunset fadeth in the West, Which by-and-by black night doth take away, Death's second self, that seals up all in rest. In me thou see'st the glowing of such fire That on the ashes of his youth doth lie, As the deathbed whereon it must expire, Consum'd with that which it was nourish'd by. This thou perceiv'st, which makes thy love more strong.

To love that well which thou must leave ere long.

Theories of Authorship

Shakespeare's unequalled accomplishments, and his reputation as the greatest literary genius the world has ever known, have led many to study his life in order to gain a fuller knowledge and understanding of him. However, the few facts known about Shakespeare's life do not explain his genius. Bitterly disappointed as a result, some ill-informed but ardent admirers of Shakespeare's plays have declared that the actor Shakespeare from the town of Stratfordon-Avon could not have written these masterpieces. They have tried to find some man of Shakespeare's time whose life is better known and whose career better fits their notion of what the life of a literary genius ought to be. Among those to whom the authorship of the plays has been most popularly attributed are Edward de Vere, Earl of Oxford; Francis Bacon, the Viscount St. Albans; and William Stanley, the Earl of Derby.

All kinds of arguments have been set forth in books and articles to show that one or another of



Above: Queen Elizabeth was ruler of England during most of Shakespeare's life. This old print shows the richness of her costume, for which she was renowned. Lower right: An Elizabethan farmer sowing grain by hand. Note his clothing, especially his tight-fitting cap and his long hose. Contrast his dress with that of his queen and of the gentry pictured on the opposite page.

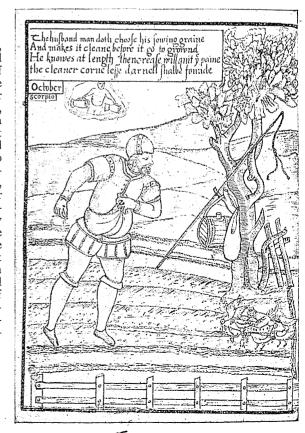
Photos: Folger Shakespeare Library

these noblemen wrote the plays. Secret ciphers, curious engravings, revealing portraits, and cryptic allusions have been pointed to as proof that someone other than Shakespeare was the author. The writers who have adopted one or another of these theories, known as Baconians, Oxfordians, or anti-Stratfordians, have been sincere admirers of Shakespeare's plays, but not very well informed about Elizabethan life. All have assumed that the literary genius who wrote the plays would surely have excited biographical interest in the seventeenth century, as he does in the twentieth. Mark Twain, for instance, could not understand why, if Shakespeare wrote the plays, there were not as many stories printed about him in Stratford as there were about himself in Hannibal, Mo. Close students of Elizabethan life, however, point out that other literary men of genius in Elizabethan times, such as Christopher Marlowe and Edmund Spenser, left even fewer records of their lives than did Shakespeare. It is noteworthy that no Shakespearean scholar of standing has ever supported any of these anti-Stratfordian views.

Shakespeare, a Man of His Own Time

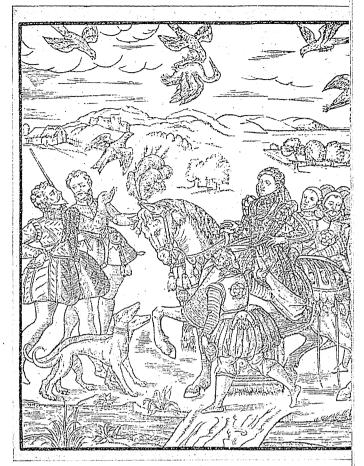
Every man, from the greatest genius to the most obscure beggar, reflects the beliefs and the living conditions of his own time. To this universal law Shakespeare is no exception. Although centuries after his death his plays are acted and read in most of the countries of the world, although his comments on men and women are so apt that in the twentieth century he is quoted more often than any other writer, he still remains a man of the Elizabethan Age, with the tastes and prejudices common to his time. "Elizabethan" is a confusing word, used with various meaning. Elizabethan literature is generally taken to mean not simply the literature written when Elizabeth was on the throne, from 1558 to 1603, but that composed between about 1579, when Spenser's Shepherd's Calendar was published, and 1625, when King James I died. Elizabethan drama is the term generally used to refer to plays appearing between Lyly's first comedy in 1584 and the closing of the theaters by law in 1642. Thus, although the last quarter of his life was actually lived under King James I, Shakespeare is always called an Elizabethan writer. An adequate understanding of Shakespeare, therefore, is dependent upon some knowledge of the conditions under which he lived and worked.

Great Elizabethans. The Elizabethan Age is one of heroic achievement in the history of the English-speaking peoples; Shakespeare was by no means the only great man in his time. In literature, no other period has been more brilliant. Edmund Spenser, Sir Philip Sidney,



John Donne, the great poet and preacher, Ben Jonson, Christopher Marlowe, John Fletcher, and Francis Bacon were all contemporaries of Shakespeare. The period was one of exploration and great maritime expansion, and Shakespeare may well have known such great captains as Walter Raleigh, Francis Drake, Martin Frobisher, John Hawkins, and Henry Hudson. In government such famous political figures as Francis Walsingham, William and Robert Cecil, and the great lawyer, Edward Coke, were all living in London when Shakespeare did. Queen Elizabeth herself, whom Shakespeare probably saw many times and before whom he acted at Court, was one of the most brilliant sovereigns England ever had. Shakespeare was but one among many great figures of the day.

London of Shakespeare's Day. For Shakespeare, as for all Elizabethans, especially for the dramatists, London was the heart of England. Although it was a city of less than 200,000, all the theaters, all but two of the printers and publishers, and most of the great merchants were established there. The Queen and her court, with their dazzling display, were nearly always in and about London, and their presence not only lent the city such color as is to be found in no modern metropolis, but it also influenced the daily lives of the citizens. Yet, judged by modern standards, London was a dirty, crowded city, with open sewers and only a few cobblestone streets. Insanitary conditions led to frequent epidemics of the plague, in which large numbers died. Fear of these epidemics was ever present, and Shakespeare took for granted

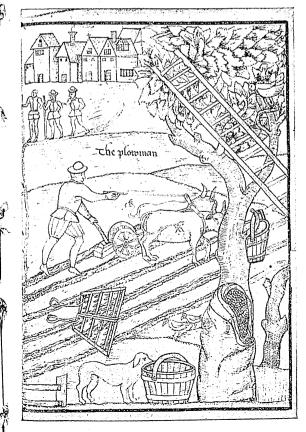


Above: This picture from The Booke of Falconrie shows how the well-to-do people dressed during Elizabeth's reign. Notice the rich trappings of the horse. Hunting with trained falcons, or hawks, was a favorite sport among the gentry. Lower left. An Elizabethan farmer plowing a field with a two-wheeled, wooden plow, drawn by a yoke of oxen. Crude harrows, like that near the edge of the field, were used after plowing. Note that this farmer's hat and clothes differ from those of the sower (opposite). Photos: Folger Shakespeare Library

a knowledge of the terror which the plague inspired, as is shown in the second scene of Act V of *Romeo and Juliet*.

Although crowded conditions in part caused these epidemics, they also gave London an air of bustling activity. Shops generally opened right onto the street, and apprentices called their masters' wares to every passerby. Because houses were crowded and the inner rooms tended to be dark and musty, people spent more time in the streets than city dwellers do today. The many street meetings and conversations in Shakespeare's plays reflect this tendency of the London populace to spend its leisure time in the market places and out of doors.

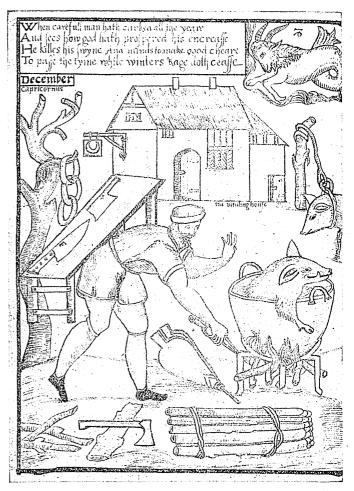
Influence of the New World. In Shake-speare's London the average man was curiously divided in his outlook between the medieval and the modern. The amazing new world of the Americas was very much with him as he listened to the tales told by mariners who had sailed with Frobisher or Hudson or had raided Spanish galleons returning from Mexico and Peru with silver and gold. The famous Golden Hind, the



very ship in which Drake had sailed around the world, was tied up at Deptford for all Londoners to see, a solid witness to the extraordinary new fact that the world was really round. This background of sailors' stories of wonderful far-away lands is particularly apparent in Shakespeare's Tempest. Many details of the wreck and of Prospero's island came from stories about the Sea Adventurer, an English ship wrecked in Bermuda on her way to Virginia in 1609. The same interest in seas and ships is evident in The Merchant of Venice and Twelfth Night.

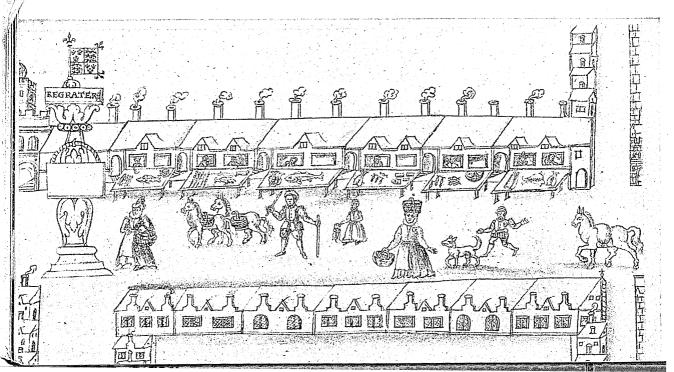
Superstitions. For all his interest in the New World, new discoveries, and strange facts, the Elizabethan Englishman still retained many superstitious beliefs which seem odd today. As belief in ghosts, witches, and magicians was common, Shakespeare used them in such plays as Julius Caesar, Macbeth, The Tempest, Hamlet, and Richard III. Equally common were beliefs in portents—dreams, supernatural sights, and sounds, which warn men of future catastrophes. Such warnings Elizabethans accepted as probable enough when Shakespeare used them.

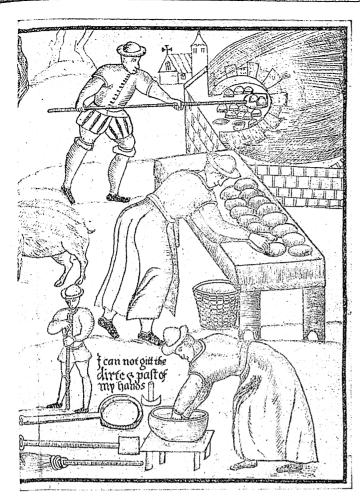
The Audience. Audiences of Shakespeare's days were both more primitive and more cultivated than they are today. That they were more primitive is shown by their liking for cruelty and bloodshed. One of the most popular sports was bullbaiting, in which the spectators, seated about an arena, watched a tied bull fight bulldogs. Loud was the applause when a bull tossed a dog so high in the air that he was killed by his fall or when a dog got a firm grip on the bull's lip and held on until his jaws had to be pried apart. Equally popular was bearbaiting, in which dogs fought with a bear, or men stood about and whipped a chained blind bear while he tried to get at them. The same people who attended these sports at the Bear



Above: A winter butchering scene in Elizabethan England. The hog in the large kettle has been butchered and is being scalded so that its bristles can be more easily scraped off. Note the crude knife, cleaver, tongs, bellows, and ax. Below: Newe Fishe Streete, a busy market in the London of Shakespeare's day. When business began in the mornings, the shutters were opened outward and used for displaying the various kinds of fish. Sidewalks were unknown in Shakespeare's day; everyone walked in the streets.

Photos: Folger Shakespeare Library





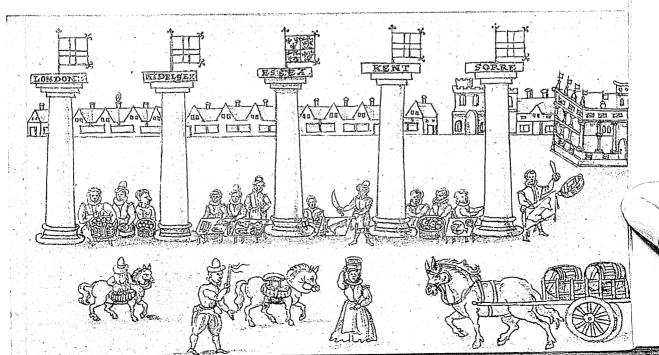
Above: Bread was baked in large brick and clay ovens. First a wood fire was built and allowed to burn until the oven was red hot. The wood embers and ashes were then raked out and the bread dough put in its place. Below: Like Newe Fishe Streete, the Grace Churche Market was a bustling trading center in Elizabethan days. All kinds of wares were displayed on street stands and "let the buyer beware" was the rule of the day. Notice the dress of the period for men and women, the crude type of two-wheeled cart in use, and how women carried away their purchases.

Photos: Folger Shakespeare Library

Garden near Shakespeare's Globe Theater also flocked to the public executions of traitors at Tyburn. People accustomed to such sights were not shocked when Gloucester's eyes were put out in *King Lear* or Titus' hand was cut off in *Titus Andronicus*.

Music. Yet these same Elizabethans with their thirst for cruelty had a taste for music and poetry that has rarely been equalled. Their enthusiasm for poetry is apparent in the amount of verse published and in the number of plays, most of them written in verse, performed during Shakespeare's lifetime. Of the popular delight in music there are many examples. Elizabethan barbershops entertained waiting customers, not as modern shops do with newspapers and magazines, but with lutes (guitarlike instruments) on which the customers might play accompaniments for themselves and their friends. The common entertainment in ordinary homes was not cards or books but music. After dinner, songbooks were passed around, and each person was supposed to be able to read his part at sight and join in the singing. A man who could not sing or read music was thought poorly reared. As music was so popular and so widely understood, it is little wonder that most Elizabethan plays have music in them. Shakespeare used fifty or more songs in his plays and wrote hundreds of stage directions calling for music. Only one of his thirty-seven plays is, like most modern plays, wholly without music.

This almost invariable use of music shows not only that there was a constant demand for what Shakespeare called the "concord of sweet sounds," but also that the playwrights could count on the presence of singers and musicians among the actors who performed their plays. All London theaters had orchestras, some of them very good indeed. At one time the orchestra at Shakespeare's Blackfriars Theater was said to be the best in London.



Innyard Theaters. The peculiar structure of the theater in which his plays were first acted also influenced Shakespeare's play writing. Modern writers with little knowledge of the theater often overlook this influence. All good dramatists, from the Greeks to the moderns, have planned their plays to take full advantage of the peculiarities of the buildings in which their plays would be performed. Consequently, the changing characteristics of theater buildings have always had a great influence on plays.

The first theater in England was built when Shakespeare was twelve years old. For many years before that, the troupes of actors had presented their plays in innyards. Such places were very convenient and amazingly welladapted for the purpose, because of the peculiar structure of the Elizabethan inns. These twoor three-story buildings were erected in the. form of a hollow square surrounding a paved courtyard where travelers dismounted and wagons were unloaded. Around this courtyard at the second and third stories, ran galleries or balconies normally used by the guests of the inn to get to their rooms. When the players came to town, they found it very easy to erect a platform stage at one end of the innyard. On the afternoon of the performance, one actor stood at the entrance to the courtyard to collect a general admission fee. Another actor at the foot of the stairs leading to the galleries collected a second fee for the reserved seats. The patrons who paid only the general admission fee stood in the courtyard around the platform stage; those who sought reserved seats went up to the galleries and sat on the stools and benches provided there. All the action of the play took place on the open platform, with no curtain to cut off the view of the stage at any time. The actors had to walk on and off in full view of the audience, and if any character in the play died on the stage, he had to be carried off. This open platform surrounded by the audience is the fundamental feature of the Elizabethan stage, whether in the innyard or in the later theaters. Its influence is to be seen in nearly all the plays of the time.

First London Playhouse. When the drama became so popular in London that a permanent theater promised to be a good investment, James Burbage, father of the Richard Burbage who became the greatest actor of the time and creator of many of the chief roles in Shake-speare's plays, built the first London playhouse and named it "The Theater." It was located in the suburbs north of the city, where it was outside the jurisdiction of the Lord Mayor and the Council, who were always hostile to plays and players and interfered with them whenever possible. All the London public theaters built in Shakespeare's lifetime—The Curtain, The Globe, The Fortune, The Red Bull, The Swan, The Rose—were also located in the suburbs,

either north or south of the city. All these public theaters were similar to Burbage's in design.

Naturally enough James Burbage and the theater builders who followed him patterned their theaters after an innyard, with a few additional conveniences added for the patrons and the actors. Even in the theaters the spectators who paid general admission stood on the bare ground about the stage with only the sky for a roof, just as they had done at the innyard performances. Hence these poorer spectators, unable to pay for seats in the galleries, were called "groundlings" by Shakespeare in some rather insulting remarks he made about them in Hamlet. By paying a few pence extra to go up in the galleries, the well-to-do spectators had somewhat better accommodations than had been available at the inns, for the theater galleries were deeper and were provided with fairly comfortable benches.

Naturally enough, most of Burbage's improvements were designed for the convenience of the actors. Behind the stage there were dressing rooms; above it was a high canopy for lowering gods and apparitions through the air. There were trapdoors in the floor, and three different entrances. More important still, there were two new parts to the stage. Behind the large platform on which most of the action took place was an alcove, a room shut off from the audience by a curtain which could easily be pulled aside. In this room, called the inner stage, actors could be suddenly revealed or hidden by the curtain, as they are in modern theaters. It was on this part of the stage that the death of Desdemona took place in Othello, the Capulets' tomb in Romeo and Juliet was placed and Ferdinand and Miranda played chess in The Temp-In short, the inner stage was used for any scene requiring a curtain—any scene which could not be opened by a single sentence or closed by a simple exit.

Directly above the inner stage a part of the balcony was partitioned off. This upper stage was used when the action required certain characters to stand above the others—on the walls of a city, on a balcony, or in an upper room of a house. Juliet stood on the upper stage while Romeo made love to her from the garden in the famous balcony scene of Romeo and Juliet. There, too, stood the governor of Harfleur when he surrendered the town to King Henry in Henry V, and Cleopatra and her maids occupied it when they drew up the dying Antony in Antony and Cleopatra.

These were the fundamental characteristics of the public theaters in which Shakespeare rehearsed and acted, and for which he wrote his plays. Although there were private theaters in London at the time, there is no evidence that Shakespeare ever wrote for them until his company took over The Blackfriars in 1608, when

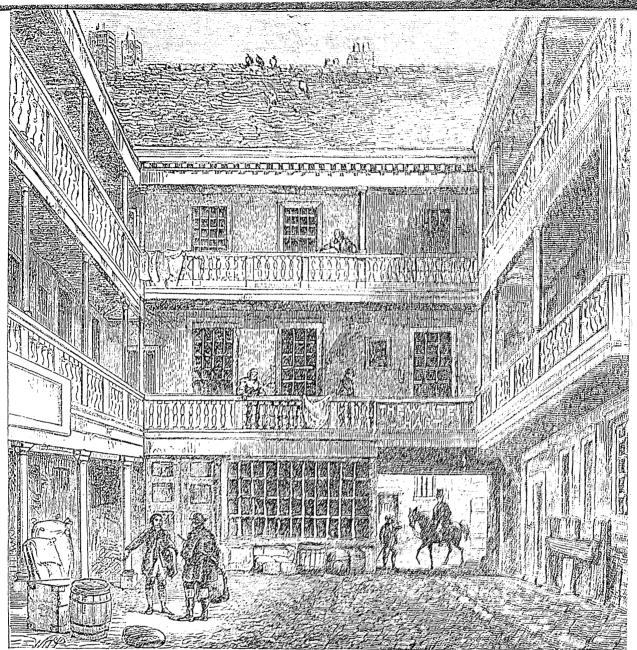


Photo: Folger Shakespeare Library

AN INNYARD, THE FORERUNNER OF THE FIRST PLAYHOUSE

In such innyards as this the early plays of Shakespeare were presented. A stage was erected at one end for the actors. Those who paid for reserved seats sat on stools and benches in the galleries while those who paid general admission fees stood in the courtyard.

his career as a playwright was nearly over. Many of the Elizabethan plays were acted in both public and private theaters. The private theaters differed from the public ones in being smaller, completely enclosed, artificially lighted, and fitted with seats on the main floor as well as in the balcony. As they charged much higher prices, it was not possible for poorer people to attend; consequently the private theaters were a little more select.

Stage Properties. Elizabethan plays moved much more rapidly than do modern ones. The numerous act and scene divisions in modern versions of Shakespeare's plays (most of which have been added by editors) suggest many curtains and intermissions, but these divisions were scarcely noticeable to the Elizabethan audience. One scene followed another without pause, as there was no curtain to fall and no scenery to be moved. In most scenes there was no reference to the place of action; the spectators simply concentrated on the actors and gave no thought to the place. Such a situation is difficult for modern readers to conceive, for in all modern plays each scene is definitely located and scenery is generally used.

In spite of the lack of scenery, however, Shakespeare did not write his plays for a colorless production on a bare, drab platform. The back wall of the stage was hung with bright tapestry, or arras, behind which characters sometimes concealed themselves, as did Polonius before Hamlet plunged his rapier through the arras to kill him. Properties of all kinds were regularly used—tables, benches, beds, chairs, chests, and even trees, rocks, and walls on occasion.

Costumes. The most colorful part of an Elizabethan production was undoubtedly the costumes. These are seldom equalled on the modern stage, for not even the most formal gowns and uniforms of today offer such a vivid variety of colors and materials as did the everyday dress of Elizabethan ladies and gentlemen. Not only was the costume of any young gentleman likely to display crimson and grey, purple and gold, but the styles were also varied so that no two gentlemen looked alike. Any welldressed young man, as Orlando, Bassanio, or Romeo, differed as sharply in appearance from a servant, clergyman, or physician as a modern bank president differs in appearance from a circus clown.

Elizabethan costume was thus of great value to the actors and dramatists of Shakespeare's day, who exploited it to the fullest in giving color and variety to their plays. On several occasions one producer is known to have spent twice as much for the costume of one actor as he paid the dramatist for the play in which the costume was worn. Moreover, the variety of costumes, haircuts, and beards offered certain possibilities both in real life and in plays which have practically disappeared from modern life. The chief of these was disguise, almost unknown in twentieth-century plays and rare in modern life. The reason is that most men now shave and cut their hair in the same general style, and their clothes differ only in details. Today a man can do little to change his appearance radically without making himself conspicuous. But when costumes, beards, and haircuts differed as they did in Shakespeare's day, it was fairly easy for a clever man to deceive even his close friends for a limited time, as did Kent in King Lear.

Women's Parts. The most common disguise in Shakespeare's plays, the one most puzzling to modern readers and actors, is that of young ladies as boys. Here the Elizabethan actor and playwright had other advantages in addition to the variety in costume. There were no actresses on the London stage when Shakespeare wrote. All women's parts were taken by boys, as they had been in all English plays for centuries. These boys, of course, were apprenticed to actors. For several years they lived with the players, heard stage talk all the time, attended hundreds of rehearsals, saw a play nearly every afternoon, took small parts in productions, and practiced female impersona-

tion at every opportunity. It is little wonder that after several years of such life a bright, talented boy could, with the help of a careful dramatist, a good make-up man, and an intelligent costumer, present a convincing portrayal of Rosalind, Viola, or Portia. Yet nothing could be simpler than for him to stop pretending to be Rosalind and become Ganymede, drop Viola for Cesario, or change the dress he was wearing as Portia for the formal robes of Balthasar, the young lawyer.

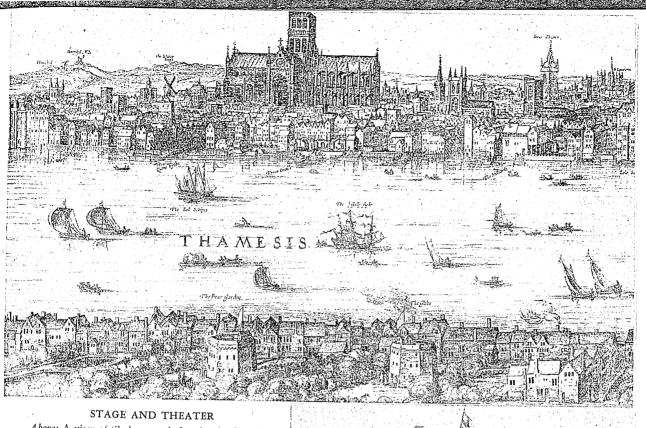
Thus Shakespeare was not only deeply influenced by the character of Elizabethan life, but he also employed brilliantly the peculiarities of his own medium—the Elizabethan stage. Great artist that he was, he constructed his plays to make effective use of the inner, outer, and upper stages, to take full advantage of the swift, continuous action of a curtainless front stage, to exploit to the fullest the variety and color of Elizabethan costume, and even to make an asset out of the liability of having no women actors for female roles.

Editions of Shakespeare

First Quartos. The fact that plays had a somewhat low literary reputation in Shake-speare's time is reflected in the early editions of his dramatic works. During his lifetime less than one half of his plays were ever printed at all, and those that did appear were in the form of cheap pamphlets, now called quartos, many of them without even the author's name on the title page. None of these quartos was ever proofread by Shakespeare, and all have numerous mistakes in the printing. Four of them omit at least one fourth of the lines of the play as written by Shakespeare. Such careless printing characterized nearly all plays of the time, and Shakespeare was like all his fellow dramatists (with the single exception of Ben Jonson) in showing little or no concern about the publication of his plays. His whole attention was directed toward the stage.

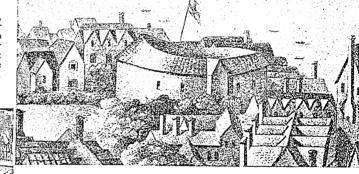
The First Folio. Seven years after Shakespeare's death, when plays had risen somewhat in public esteem, two of his old friends and fellow actors, John Heminges and Henry Condell, collected his plays and had them printed in a large and handsome volume. It contains the famous Droeshout portrait of Shakespeare, a preface by the editors, a list of actors who had had roles in Shakespeare's plays, a dedication to two noblemen, and several verses in honor of the playwright, as well as thirty-six of his plays. In 1623, when this volume of collected works was brought out, such a book was most unusual, for only one other collection of plays had ever been published in England.

This volume, now called the first folio, is the chief basis for Shakespeare's text. Even when it first appeared, it was somewhat expensive,



Above: A view of Shakespeare's London by Visscher, the famous engraver. In the foreground are the Bear Garden and the Globe Theater. Right: A close-up view of the Globe Theater with the flag flying to show that a performance is scheduled for that day. Below: The stage of the middle-seventeenth century. Notice the curtains at the rear and the balcony above it.

Photos: Folger Shakespeare Library; Dorien Leigh



Below: An old sketch showing the stage and galleries of the famous Swan Theater. located not far from the Globe Theater. Photo: Folger Snakespeare Library





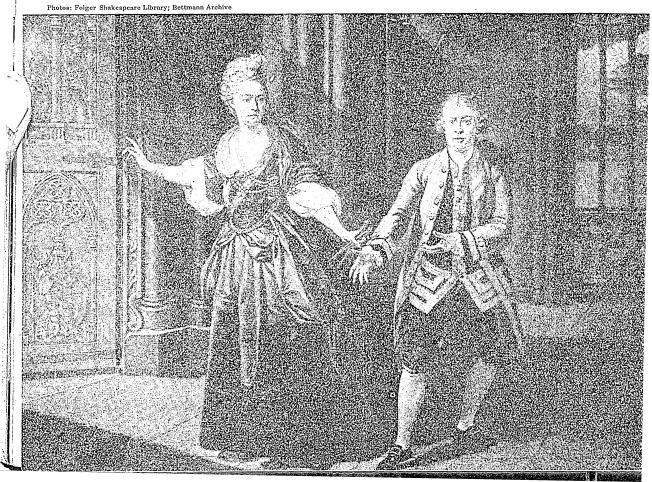


FAMOUS SHAKESPEAREAN ACTORS OF EARLIER DAYS

Upper left: Ellen Terry, the greatest actress of her day, as Portia, in the trial scene of The Merchant of Venice. This was the most famous role of the English actress. Upper right: John Drew, one of America's best actors, as Petruchio, in Shakespeare's Tanning of the Shrew. Below: In the nine-teenth century Shakespeare's plays in their original form

were revived, chiefly through the efforts of David Garrick, the leading actor of his time. Here, he and Mrs. Pritchard are shown in Act II, Scene 3 of Macbeth. It was Garrick who once said of Shakespeare:

"Ye children of nature of fashion and whim, He painted you all, all join to praise him."



selling for one pound (about \$4.86) unbound. Today, only the wealthiest collectors can afford to buy it, sometimes paying as much as

\$75,000 for a single copy.

Elaborate as the first folio was, it was poorly printed according to modern standards. It is a beautiful book full of misprinted words, lines repeated or dropped out, impossible punctuation, and verse printed as prose and prose as verse. Ever since it appeared, editors have been trying to correct its mistakes. Many errors have been rectified by comparing the corrupt passage with the same line in a quarto; others by applying present-day knowledge of Elizabethan handwriting and obsolete Elizabethan words; and still others by using common sense. However, many of the errors still exist, for no one has ever been able to puzzle out a satisfactory correction of certain meaningless lines in the first folio.

Later Editions. As hundreds of editors and scholars have labored during the last three hundred years to make it easier for modern readers to understand and enjoy Shakespeare's plays, it is obvious that the text of a twentiethcentury edition of Shakespeare is very different from that originally put forth in the seventeenth century. A few of the mistakes in the first folio were corrected by the anonymous editors of the second folio in 1632, of the third folio 1663-1664, and of the fourth folio in 1685, but these men made more new mistakes than they corrected old ones. The first editor to make any very extensive effort to help the reader was the playwright Nicholas Rowe, who edited Shakespeare's plays in six volumes in 1709. He wrote the first life of the dramatist; made lists of dramatis personae for the twenty-eight plays which had never had them before; divided the plays into acts and scenes, a task which had been only partially done in the folios; and added many stage directions to supplement the small number in the earlier folios. In 1733, Lewis Theobald edited Shakespeare's works in seven volumes, and made more good corrections of bad lines than any other man has ever

Hundreds of editions of Shakespeare have followed in the last two centuries, all the best ones making use of the corrections and explanations of their predecessors and adding new ones. Most famous are the editions of the learned Samuel Johnson in 1765; the twenty-one-volume edition of Edmund Malone and James Boswell in 1821; and W. Aldis Wright's Cambridge edition of 1863-1866. The most elaborate edition which was begun by Howard Furness in 1871 but is not yet completed. The vast collection of notes and comments in the bulky volumes of this edition are a monument to Shakespearean scholarship.

Popular Editions. All these famous editions

are useful to scholars, but for most people they are more confusing than helpful. Of greater help for twentieth-century readers are those with notes explaining obsolete words and puzzling situations. There are many such editions in a variety of forms. The most compact are the complete editions in one volume, such as The Complete Works of William Shakespeare in the Students' Cambridge Edition of William Allan Neilson, 1906, or the more recent Complete Works of William Shakespeare edited by George Lyman Kittredge in 1936. Both these volumes have introductions and glossaries but, because of their necessary bulk, no notes. Of the more expensive editions, issued one play to a volume with fairly extensive notes, The Arden Shakespeare and The Tudor Shakespeare are good. For readers who need notes but cannot afford large sets of books, a convenient compromise is to be found in Shakespeare, by Thomas Marc Parrott, an annotated onevolume edition published in 1938. This book contains twenty of the more familiar plays, together with a discussion of Shakespeare's life and background. Convenient and inexpensive editions of four or five plays, bound in one volume with notes and introductions, are to be had in Holzknecht and McClure's Selected Plays of Shakespeare, and in the Arden edition of Five Comedies of Shakespeare, Five Tragedies of Shakespeare, and Five Histories of Shakespeare.

Shakespeare through the Ages

Child of his own age though Shakespeare was, no man has ever succeeded more completely in conveying his art to other nations and other ages. His own contemporary, the dramatist Ben Jonson, was one of the first to realize this when, seven years after Shakespeare's death, he wrote, "He was not of an age, but for all time."

More than any of the tributes paid to Shakespeare the poet, those to Shakespeare the playwright would probably have given the greatest pleasure to the actor, dramatist, and stockholder of the King's Company. Scarcely a year in the three hundred fifty which have passed since he began to write, has been without its production of one or more of his plays. So constantly has Shakespeare been in the repertory of the greatest actors that the history of the English and American stage could almost be written in terms of Shakespearean performances.

Famous Shakespearean Actors. Since Richard Burbage performed Hamlet, Othello, Lear, and Richard III during Shakespeare's lifetime, nearly all famous actors have chosen his plays as their vehicles. After the death of Shakespeare and Burbage, Joseph Taylor and John Lowin continued to act in the plays for the King's Company. After the Restoration in 1660, the greatest English actor of the time,



Thomas Betterton, played Hamlet, Brutus, and Othello. His wife, Mary Sanderson, was one of the first women to act in a Shakespearean

play.

In the next generation Addison and Steele saw the actor-manager Colley Cibber as Iago, Jacques, and Richard III. Samuel Johnson's generation admired one of the most famous of all actors, David Garrick, as Hamlet, Richard III, and Lear. Also applauded at that time were Charles Macklin's Shylock, James Quin's Falstaff, and Peg Woffington's Rosalind. In Wordsworth's and Coleridge's day, John Philip Kemble played in twenty-seven different Shakespearean roles; and Sarah Siddons, probably the most renowned of all Shakespearean actresses, was famous as Lady Macbeth, Desdemona, Ophelia, and Queen Catherine in Henry the Eighth. Even before she appeared in her greatest role, Lady Macbeth, Samuel Johnson was so impressed that he wrote his name on the hem of her dress in Sir Joshua Reynolds' famous portrait of her as the "Tragic Muse," saying "I would not lose the honor this opportunity afforded to me for my name going down to posterity on the hem of your garment.

In the mid-nineteenth century, crowds flocked to see Edmund Kean as Shylock, Hamlet, Othello, Macbeth, and Lear; William Charles Macready as Richard III, Lear, and Henry V; and Helen Faucit as Juliet, Desdemona, and Lady Macbeth. The favorites of the Victorians were Sir Henry Irving and Ellen Terry. Sir Henry dominated the stage of his time almost as completely as Garrick had a hundred years before, his Merchant of Venice running for two hundred fifty consecutive performances. In North America, Edwin Booth was the greatest Shakespearean actor of the

time.

In the first quarter of the twentieth century some of the best-known Shakespearean actors were Sir Herbert Beerbohm Tree, Robert Mantell, Edward Hugh Sothern and Julia Marlowe (his wife), Sir Robert Benson, Sir Johnston Forbes-Robertson, and Mary Anderson.

Today, famous performers of Shakespeare are still drawing crowds. In the last twenty years John Gielgud, John Barrymore, Walter Hampden, Ethel Barrymore, Maurice Evans, Leslie Howard, Katherine Cornell, Charles Laughton, Edith Evans, Alfred Lunt, Lynn Fontanne, Jane Cowl, and Helen Hayes have performed Shakespeare with great success. The motion-picture version of *Romeo and Juliet* was successfully produced, as were many radio versions of Shakespeare's plays.

More like the repertory system of play production in Elizabethan times are the performances in theaters devoted wholly or chiefly to the production of Shakespearean plays. The most famous are the Old Vic in London and the

Shakespeare Memorial Theater in Stratford-on-Avon. The latter is one of the finest theaters in the world, with a permanent repertory company of actors, who have occasionally toured the United States.

Memorials

Memorials to Shakespeare of one kind or another are scattered throughout the worldtheaters, statues, pictures, and books. Even streets, towns, and commercial products are named for him and his characters. One of the greatest of the memorials and one of which Americans can be especially proud, is the Folger Shakespeare Library in Washington, D. C. This is the greatest collection of books, manuscripts, and pictures relating to Shakespeare and his time that has ever been made. Scholars from all parts of the world come to the Folger Library to study the material gathered there. In the years to come, probably no other memorial to Shakespeare will have so great an influence on the knowledge and understanding of the man and his plays. Other notable libraries housing important Shakespearean collections include the Bodleian Library at Oxford, England; the British Museum; the Horace Howard Furness Memorial at the University of Pennsylvania; and the Henry E. Huntington Library at San Marino, Calif. G.E.B.

Related Subjects. The reader is referred to:
Avon Hamlet
Drama Holinshed, Raphael
Elizabeth London
English Literature Macbeth
Stratford-on-Avon

The Synopses

As You Like It. The scenes of this delightful comedy are laid chiefly in the Forest of Arden, where shepherds lead an easy life and everything is "as you like it." To the forest come a banished French duke and his followers, leaving at court his daughter Rosalind; his usurping younger brother, Duke Frederick; and the latter's daughter Celia, who pleads so eloquently for her cousin's companionship that Frederick allows Rosalind to remain. In a court match, the duke's professional wrestler is overcome by a youth named Orlando, who proves to be the son of an old friend of Rosalind's father. Rosalind and Orlando fall in love, but are soon separated. Rosalind is banished by Frederick, and, accompanied by Celia, who refuses to desert her, and Touchstone, the court jester, takes refuge in Arden. There the girls buy a farm and live as brother and sister, Celia posing as a shepherdess and the taller Rosalind wearing man's clothing and calling herself Ganymede, a young shepherd.

Meanwhile, Orlando flees to Arden with his old servant Adam, to escape the plotting of his murderous brother Oliver, and finds a refuge with the banished duke. His love verses to Rosalind, which he carves on the bark of trees, are read by the disguised Rosalind, and when they meet, she tests him by offering to impersonate Rosalind that he may be cured of his love by meetings and conversations with her. Reluctantly Orlando consents, to Rosalind's delight. Now and then the melancholy Jacques contributes a bit



MODERN SHAKESPEAREAN ACTORS

Above: Maurice Evans, as Falstaff, in King Henry IV.

Below: Leslie Howard and Norma Shearer in the motionpicture version of Ronco and Julict.

Above: George Arliss, as Shylock, in The Merchant of Venice.

Below: Helen Hayes, as Viola, in Twelfth Night.

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of cynical philosophy. One day Orlando kills and is wounded by a lion menacing his brother Oliver, who has come to the forest in search of him. The penitent Oliver, sent to Ganymede with a note explaining why Orlando is delayed in keeping a tryst, sees Celia and falls in love with her. The play ends happily with a wedding of four couples. Rosalind, having resumed her feminine guise is wed to Orlando; Touchstone is married to the country maid Audrey; Oliver is wed to Celia; and the shepherd folk, Phebe and Silvius, complete the party. In the midst of this rejoicing, word comes that Duke Frederick has restored the dukedom to Rosalind's father, and at the end all is well.

Hamlet, the most famous of Shakespeare's plays, is a drama of revenge. Hamlet, a young prince of Denmark, is grieved and mystified by the sudden death of his father; by his beloved mother's hasty marriage with the dead king's evil, plotting brother, Claudius, who has usurped the throne; and by the stupidity and (as he thinks) faithlessness of his sweetheart Ophelia. the daughter of Polonius. Warned by his friend Horatio that a ghost resembling his father was appearing nightly before the castle, Hamlet watches for the specter, and in a thrilling night scene is told the story of his father's murder at the hands of Claudius. Hamlet's actions have been variously interpreted: most critics believe he only feigned madness to lull suspicions and to get opportunities for revenge, a course especially distressing to Ophelia. Shocked and overwhelmed by the evil in his world, Hamlet must await the right moment to act, and broods over the pain of life, even contemplating suicide. A band of strolling players arrive, and Hamlet traps the king and queen by having the actors speak certain lines about a king's being murdered by his brother. Claudius feigns illness and leaves the hall, disclosing his guilt. Later, in his mother's room, Hamlet upbraids her for her conduct. During this interview he thrusts his dagger through a curtain behind which he thinks the king is hiding, but it is old Polonius who is killed as he eavesdrops.

Sent to England by the alarmed Claudius, under escort of Rosencrantz and Guildenstern, Hamlet finds they carry written orders to have him killed, and secretly substitutes their names for his. He escapes and returns to Denmark, reaching there in time to witness the burial of Ophelia, who has lost her reason and been drowned. At the grave, an encounter between Hamlet and Ophelia's brother Laertes, who plots with Claudius to kill the prince, is followed by a fencing duel between the young men. Laertes uses a poisoned foil with which he wounds Hamlet. The young prince turns this weapon on Laertes, and before he, himself dies, succeeds also in stabbing his treacherous uncle. The guilty mother reaps her just punishment by accidentally drinking the poisoned cup prepared for Hamlet.

Henry IV, Parts I and II. The two parts of this historic play form a dramatic whole, and give a vivid picture of England in the early fifteenth century. The chief characters are King Henry IV, conscience-stricken for having usurped the throne from Richard II; his two sons, the merry Prince Hal and Prince John; Hotspur (Henry Percy), son of the Earl of Northumberland; and Sir John Falstaff, a dissipated, corpulent old warrior whose escapades provide most of the humor of the play. Falstaff is Prince Hal's boon companion. King Henry, longing to go on a crusade to expiate his sins, is delayed by rebellion in Scotland and Wales. He quarrels with Hotspur over the

delivery of prisoners taken on the field of Holmedon, and the Percys revolt against him. On the field of Shrewsbury, Hotspur is slain by Prince Hal. In the concluding scenes of Part I, Falstaff feigns death to avoid being killed, and carries off the body of Hotspur when the coast is clear, boasting that he himself killed him in an hour's fight.

In Part II there is a continuation of the buffoonery of the Falstaffians, intermingled with the chronicle of the broken old king, approaching his end and worried over the Percy rebellion. News comes of the end of the disorder through the manipulation of Prince John, who has offered the rebels peace with honor, and then had the scattering troops killed and the leaders executed. The death of King Henry follows, and Prince Hal is crowned Henry V. He shows himself a real king, and forbids the Falstaffians to come within ten miles of him until they reform. See Henry (Henry IV).

Henry V. This play gives an idealized picture of a brave and gallant monarch, Henry V. Forsaking the carefree friends of his youth, the king embarks on a career of foreign conquest by demanding the throne of France from the French dauphin. The dauphin responds with the gift of a box of tennis balls, and England prepares for war. In France, the English troops, stirred by their king's eloquent appeal, force the surrender of Harfleur and encamp before Agincourt (which see). That night, Henry disguises himself in a long cloak and mingles with his soldiers, and, in an argument with a private, accepts the latter's glove and challenge for the next day. Though heavily outnumbered, the English win the fight.

Humorous episodes are introduced now and then, including a scene between Henry and the private, who has sworn to box the ears of the man who has his glove. Falstaff, meanwhile, has died, broken-hearted, because the king has cast him off. After the Battle of Agincourt, Henry is graciously received at the French court, and is not only promised the throne of France, but also the hand of the Princess Katharine, with whom he has fallen in love. See Henry (Henry V).

Julius Caesar. The stirring period of the declining Roman republic and a great historic character furnish the background for this magnificent drama. But in spite of its name, the play is the tragedy of Brutus, Caesar's best friend, who has five times as many lines as Caesar, and about whom the drama is built. It begins on a high note-victorious Caesar escorted to the Capitol by enthusiastic admirers and thrice declining the crown offered by the eloquent Mark Antony. But already storm clouds are gathering. Patriotic, highly respected Brutus, the "lean and hungry Cassius," and blunt-speaking Casca are plotting his downfall, for they fear that Caesar is becoming a dictator and that his kindly rule will put an end to the republic and Roman liberty. Caesar is warned by a soothsayer to "beware the Ides of March," but on that day he goes to the senate house with a group of conspirators, all pretending to be friendly, and is there stabbed to death. He resists until he sees Brutus' dagger, whereupon, drawing his cloak about him, he falls with "Et tu, Brute" (Thou, too, Brutus) on his lips.

Brutus persuades the fickle mob that the murder was necessary to save the republic, but unwisely permits Antony to deliver a funeral oration over the hacked body. The wily Antony cleverly turns the populace against the conspirators, who are forced to flee. Antony, Caesar's grandnephew Octavius, and Lepidus form a triumvirate and lead an army against

them. On the plains of Philippi, the night before the battle, Brutus is startled by the ghost of Caesar and forsees his own doom. The battle lost, Cassius orders his servant to kill him, and Brutus falls on his sword, realizing that he has killed a man he both honored and loved and that Antony and Octavius will be worse masters for Rome than Caesar ever could have been. (All the important characters in this play are described under their own titles.)

King Lear. The tragic story of King Lear gives a dramatic presentation of the relationships between parents and children. Lear, king of Britain, prepares to divide his kingdom among his three daughters: Goneril, wife of the Duke of Albany; Regan, wife of the Duke of Cornwall; and Cordelia, youngest and best beloved. The father childishly asks for an expression of their daughterly affection, and is so deceived by the older girls' fulsome endearments, and so angered at Cordelia's modest, though sincere, statement, that he disinherits her and arranges to live with the other two in turn. The good Earl of Kent is banished for his interference in Cordelia's behalf, but the dowerless girl finds a haven in the love of the king of France, who marries her.

Kent, returning in disguise to look after the king. finds Goneril ordering him to reduce his train of followers by half. Angry and hurt by Goneril's ingratitude, Lear meets Regan at the castle of the Earl of Gloucester, is harshly repulsed by her, and in despair staggers out into a night storm. With Kent and the faithful court fool, the old king, now a prey to insanity, finds refuge in a hut. He there meets Gloucester's son Edgar, who, in the guise of a beggar, is fleeing from the plots of his wicked half-brother Edmund. Gloucester arrives with offers of shelter, and has the old man taken to Dover, where Cordelia has landed an army prepared to restore her father's rights.

In camp the broken old man is tenderly cared for by Cordelia, and thinks himself in Heaven. Meanwhile, Gloucester's eyes are put out by Cornwall, and he is cared for by Edgar. In a battle between the English (commanded by Edmund) and the French, the latter are defeated, and Cordelia and Lear are taken prisoners. Edgar, after disclosing his identity to his dying father, kills Edmund in a trial by combat, but too late to save Cordelia, whom Edmund has ordered hanged. Lear dies; Goneril, jealous of her sister's love for Edmund, poisons Regan, and then stabs herself. The tragedy is somewhat relieved throughout by the jests of the court fool, whose loyal affection for his master shines through his apparent foolery.

Macbeth. One of the greatest dramas of all time. Macbeth is the story of one who suffered disaster through overreaching ambition. The scenes are laid in Scotland. On his return from a successful campaign in the North, Macbeth, accompanied by Banquo, meets three witches who hail him as Thane of Glamis, Thane of Cawdor, and King of Scotland, and prophesy that sons of Banquo will occupy the throne. At this point are planted the first seeds of ambitious design. Macbeth, already Thane of Glamis, is soon appointed Thane of Cawdor by King Duncan. With the vision of the kingship before him, and urged on by his wife, Macbeth murders the king while the latter is visiting him. The two sons of Duncan flee in terror from the castle, and draw suspicion to themselves. Macbeth is crowned king, but is uneasy concerning the witches' prophecy about Banquo and his sons. Accordingly, he hires assassins to murder · Banquo and his son Fleance. At a state banquet, the king is told that Banquo has been slain, but that the son has escaped. Here, Macbeth sees Banquo's ghost and talks so wildly that the feast breaks up in disorder.

He has another interview with the witches, who tell him he must "beware Macduff," but assure him that "none of women born" can harm him, and that he need not fear until Birnam wood shall come to Dunsinane Castle. Sinking ever deeper into crime, Macbeth orders Macduff's wife and child slain when he learns of that nobleman's flight to England. These crimes so affect the queen that she becomes a prey to sleepwalking, and finally dies. Macduff, having raised a large army, advances toward the castle, with his troops screened by branches from the trees of Birnam. Horrified at seeing Birnam wood really coming to Dunsinane, but relying on the rest of the prophecy, Macbeth meets Macduff, and warns him that he will never yield to one of woman born. Macduff replies that he was "from his mother's womb untimely ripped." In the ensuing combat, Macbeth is slain and beheaded. Malcolm, son of Duncan, is then proclaimed king of Scotland.

Merchant of Venice. This, one of Shakespeare's most popular plays, is a vivid study of avarice and hatred. The merchant Antonio, generous friend of Bassanio, is hated by Shylock, the Jewish moneylender, because of personal insults, and because Antonio refuses to exact interest on loans. Bassanio wishes to borrow 3,000 ducats from Antonio, that he may go to Belmont to sue for the hand of Portia. Antonio borrows the money from Shylock, and, mindful of his several ships soon to be in port, agrees to part with a pound of his flesh if the money is not forthcoming in three months. Shylock's hatred of Antonio is increased by the elopement of his daughter Jessica, who runs away with the Christian Lorenzo, another friend of Antonio's, carrying with her many ducats and jewels. At Belmont, the beautiful and wealthy Portia is wooed by Bassanio, and both rejoice when he chooses the right one out of three caskets-gold, silver, and lead. According to her father's will, she is to marry the suitor who chooses the lead casket, which contains her picture. Their joy is interrupted by a letter from Antonio telling of the loss of his ships, and of Shylock's determination to carry out the terms of the bond. Stopping only to be married to Portia and her maid Nerissa, respectively, Bassanio and his friend Gratiano return to Venice, but are unable to help their friend in court.

When all seems lost, Portia, disguised as a lawyer, enters with her clerk (Nerissa, disguised), and argues the case. She reminds Shylock that he can have only the flesh the bond stipulates, and that if a single drop of blood is shed, his property will be confiscated. He is then willing to accept money in lieu of flesh, but the court decrees a punishment for his conspiracy against the life of a citizen, and he is forced to turn Christian and will half his property to Jessica, whom he had renounced. The play ends on a brighter note, with Bassanio and Gratiano being teased by their wives for having given their betrothal rings to the learned "doctor" and his "clerk."

Midsummer Night's Dream. In this fairy play, Theseus, the Duke of Athens, is preparing to wed the lovely Hippolyta, queen of the Amazons. Egeus, a citizen of Athens, comes complaining that his daughter Hermia refuses to marry Demetrius. Kindly told by the duke that the law orders her to obey her father, Hermia flees with her lover Lysander to the enchanted wood of the fairies, ruled over by Oberon and Titania.

They wander here in company with Hermia's friend Helena, and Demetrius, whose love Helena has lost. King Oberon has quarreled with Titania, and has ordered Puck, his attendant, to procure a magic love juice which, when applied to her eyelids, will cause her to love the first person she views on awakening. Oberon sees the unhappy Helena, and in pity he tells Puck to touch the eyelids of Demetrius with the love juice. Puck mistakenly anoints the eyes of Lysander, and it is Helena whom he first sees, on awakening. Presently there come to the wood the weaver Bottom and his friends, prepared to rehearse a play designed for the wedding festivities of Theseus and Hippolyta. The mischievous Puck puts an ass's head on Bottom, and he becomes the recipient of the dainty Titania's affection.

To add to the complications, Oberon touches the eyes of Demetrius with the love juice, and when he awakens, he begins to quarrel with Lysander, whom he sees making love to Helena. The tangle is straightened out when Puck removes the spell from Lysander's eyes, and Oberon releases Titania. Bottom, himself again, is permitted to depart. Theseus and Hippolyta, hunting in the forest, find the happy lovers, and invite them to a wedding feast at the palace. After the feast, the guests are entertained by a performance of Pyramus and Thisbe, played by Bottom and his uncouth companions.

Othello. This tragic study of the power of jealousy is one of Shakespeare's masterpieces. Othello, a Moorish general, has won the gentle Desdemona, daughter of a senator of Venice. Othello is ordered to Cypress to fight the Turkish fleet, and arranges to have his wife brought there by Iago, the personification of craftiness and malignancy, who is jealous because Othello has made Cassio his chief lieutenant, and resolves to destroy the happiness of the newlyweds. At Cyprus, Iago gets Cassio drunk and involved in a street brawl, thus bringing about his dismissal.

Insinuating that Desdemona and Cassio are in love, Iago contrives to have Othello overhear the deposed officer ask Desdemona to intercede for him. Her innocent plea adds color to the vile suggestions planted in Othello's mind, and when he sees Cassio give a street woman a handkerchief he himself had given Desdemona (which Emilia, Iago's wife, has stolen and dropped in Cassio's room), Othello, tortured by his jealousy, believes the detestable story. Ordering Iago to dispose of Cassio, Othello enters his wife's room, and after pouring forth his suspicion, strangles her while she protests her innocence. Too late he learns from Emilia her own part in the tragedy, and the story of her husband's villainy. The furious Iago stabs Emilia, and in turn is wounded by Othello. Then the Moor, who "loved not wisely, but too well," kills himself. Cassio, who has escaped with a slight wound, becomes governor of Cyprus, and Iago is led away to well-deserved torture and death.

Richard III is the last of the plays dealing with the Wars of the Roses. Richard, Duke of Gloucester, the leading role, has been played by some of the greatest actors. The audacity of Richard knows no bounds. He has been instrumental in the murder of Henry VI and of the late king's son, Prince Edward, and now plots to win the throne occupied by the feeble Edward IV. After having his brother George, Duke of Clarence, imprisoned in the Tower and killed, he brazenly woos the Lady Anne, widow of the slain Prince Edward, even while she is following the funeral procession of her father in-law, Henry VI.

Though ugly and deformed, he wins his suit by sheer force of personality. King Edward dies, and Richard manages to get himself crowned king, while the two young sons of Edward are held prisoners in the Tower.

Richard's ally, the Duke of Buckingham, repelled by the king's cruel command to murder the young princes, and by his refusal to make him an earl, joins cause with Richard's strong enemy, Henry, Earl of Richmond, a scion of the House of Lancaster. While Richard is seeking the hand of Elizabeth, daughter of Henry IV, having previously arranged for the death of Queen Anne, he is told of the arrival of Richmond. At Bosworth Field, the night before the battle that decides his fate, Richard dreams that the ghosts of all those he has murdered pass before him and bid him despair. The next day his forces are defeated, his horse is shot from under him, and he is slain by the hand of Richmond, who becomes Henry VII. See EDWARD; HENRY; RICHARD; ROSES, WARS OF THE.

Romeo and Juliet. This story of the most famous Capulet and Montague families, maintaining an ancient feud. Young Romeo, heir of the Montagues, goes masked to a ball given by Lord Capulet, and there meets and falls in love with Juliet, heiress of the Capulets. Her kinsman Tybalt would have killed him, but is prevented by Capulet. On her balcony, at night, Juliet tells of her love for Romeo, and is answered by her lover, watching below. The next day they are secretly married in the cell of the friendly Friar Laurence. On his return from the wedding, Romeo encounters Tybalt in conversation with his own friends, Benvolio and Mercutio. Tybalt wishes to fight Romeo for having attended the Capulet ball, and when Romeo refuses, Mercutio fights in his stead, and is killed. In revenge, Romeo kills Tybalt.

For killing Tybalt, Romeo is banished, while Juliet's father, suspecting nothing, tries to force her to marry her kinsman Paris. Juliet is advised by Friar Laurence to pretend to yield, and he promises that he will procure for her a potion on the wedding day that will give her, for the time being, the appearance of death. He further plans to have her placed in the burial vault, from which Romeo will rescue her. But their plans go awry. Before the friar can communicate with him, Romeo hears that Juliet has died, and in his anguish, goes to her tomb, drinks poison, and dies by her side. When she awakes and finds his dead body, she seizes his dagger and plunges it into her breast. The tragedy of the young lovers is followed by a reconciliation between the hostile families.

Taming of the Shrew is one of the wittiest of the Shakespearean comedies. It is supposed to be played by strolling actors in the effort to drive away the melancholy of a drunken tinker, picked out of the street and placed in the luxurious bed of a rich lord, as sport for the household. The shrew, Katherine, is the daughter of a rich gentleman of Padua, named Baptista. Before her father will consent to the marriage of his demure daughter Bianca, he insists that someone must marry the daughter with the shrewish temper. Among Bianca's suitors is a student, Lucentio, who disguises himself as a tutor and becomes her teacher.

Meanwhile, Petruchio, a gentleman of Verona, tempted by Katherine's wealth, decides to woo her. Having won the father's consent and set the wedding day, he comes late to the ceremony, appears finally in outrageous clothes, acts like a boor, and refuses to stay for the wedding feast. At home he roars at the

servants, beats them without cause, refuses to let Katherine eat the food they prepare, which he claims is not good enough for her, or to wear the new clothes brought by the tailor, and, in general, gives a realistic picture of a person with a most villainous temper. So well does he play his part that Kate is utterly subdued, and becomes an advocate of wifely obedience. In the course of these events, Bianca runs off and marries her tutor, while Lucentio's servant Tranio, masquerading as the real Lucentio, obtains her father's consent to marry her himself. As an added touch, the drunken tinker is supposed to find these farcical incidents very dull entertainment.

The Tempest. This beautiful fantasy represents the genius of a matured and mellowed Shakespeare. A vessel is tossing in heavy seas near the shore of an enchanted island, inhabited by Prospero, his beautiful daughter Miranda, the fairy sprite Ariel, and Caliban, a misshapen monster who is Prospero's slave. As they watch the shipwreck, Prospero tells Miranda that twelve years before, as Duke of Milan, he had been deposed by his brother Antonio and his ally, the king of Naples, and cast adrift in a small boat with his three-year-old daughter. A good friend, Gonzalo, put food and water in the boat, together with some books of magic, by aid of which he has been able to command men, spirits, and elements. Through this power, he had freed Ariel from the spell of the foul hag Sycorax, Caliban's mother, whom he found on the island when their boat reached its shores.

As Prospero and Miranda converse, Ariel comes with news that all on the wrecked ship have been saved, and the play then pictures their adventures on the island. The castaways include Antonio; Alonzo, king of Naples; the latter's son Ferdinand; and sailors and courtiers. Ariel's magic brings Ferdinand and Miranda together, discovers a plot hatched by Caliban and two drunken sailors, and brings before Prospero his former enemies and their companions. In the end, Prospero graciously forgives them, is promised the restoration of his dukedom, and, renouncing magic, plans to return to Naples. There, he tells Miranda, she and Ferdinand will be married. The faithful Ariel is made joyful by news of his freedom.

Twelfth Night. The gay spirit of the twelfth night after Christmas, from which the play gets its name, pervades this delightful comedy. It recounts the adventures of the twins, Sebastian and Viola, who become separated in a shipwreck. In a seaport city of Illyria, Viola, dressed as a page, enters the service of the Duke of Orsino. He sends her to plead his suit before the wealthy Olivia, but the lady falls in love with the page, "Cesario." The page, meanwhile, learns to love Orsino. The comic scenes, which make this play hilariously entertaining, are carried on by Olivia's uncle, Sir Toby Belch, Sir Andrew Aguecheek, Malvolio, the pompous steward, and other servants. Sir Toby, Sir Andrew, and Maria, Olivia's maid, cause Malvolio to make an absurd fool of himself by sending him a love letter containing ridiculous directions, which he thinks Olivia has written. So conscientiously does he follow these regulations that Olivia has him shut up as a madman. Sir Andrew, desiring Olivia for himself, is disturbed by the lady's attentions to the page, and, urged on by the fun-loving Sir Toby, challenges Viola to a duel.

The combat, ridiculous because of the terror of both of the duelists, is interrupted by the entrance of Captain Antonio, who has come to Illyria with Sebastian. Captain Antonio supposes it is Sebastian himself who is in trouble, and interferes. Viola runs

away, and the fight is continued by the real Sebastian, by whom Sir Andrew is soon routed. Olivia presently marries Sebastian (thinking him the page), and there is a subsequent mix-up when Olivia calls Viola her husband. The appearance of Sebastian and explanations all around clear up matters, and the duke, discovering his page is a woman, realizes that he loves her. Malvolio is released, and swears vengence on the "whole pack" of them.

Books about Shakespeare

As has been noted, there are many thousands of books which deal entirely or partly with Shakespeare. Many of them are written for scholars and assume that the reader already has an extensive knowledge of him and his work. Hundreds, however, are written for general readers. The lists which follow record some of the books which will be most helpful to young people, average adult readers, and teachers who expect to teach some of Shakespeare's plays.

Books for Young People

BENNETT, JOHN. Master Skylark. Century, 1922.
A story of Shakespeare's time. One of the bestknown pieces of fiction about Shakespeare.

HOFFMAN, ALICE SPENCER. The Children's Shake-speare. Stories from the plays with illustrative passages. Dutton, 1911.

LAMB, CHARLES, and MARY. Tales from Shakes peare. 1807 and many subsequent editions. The most popular retelling of Shakespeare's best plays for children.

MACLEOD, MARY. The Shakespeare Story-Book. Barnes, A. S., 1902. RAYMOND, C. H. Story Lives of Master Writers.

Stokes, 1927.

SLAUGHTER, GERTRUDE. Shakespeare and the Heart of a Child. Macmillan, 1922. Story of a girl who liked to read Shakespeare, in which characters and plots of more than a dozen of his plays are introduced.

WHITE, ANN TERRY. Three Children and Shakespeare. Harper, 1938. Readings from The Mer-chant of Venice, A Midsummer Night's Dream, and The Taming of the Shrew.

Books for the Average Adult

ADAMS, JOSEPH QUINCY. A Life of William Shake-speare. Houghton, 1923. The standard life of

Speare. Shakespeare. Shakespearean Tragedy. Macmillan, 1914. Illuminating critical discussions of

Shakespeare's greatest plays.

BROOKE, C. F. TUCKER. Shakespeare's Sonnets.

Oxford, 1936. The best edition of the sonnets with a discussion of some of the problems of the

BYRNE, M. St. CLARE. Elizabethan Life in Town and Country. Methuen, 1934. Everyday life of English people in Shakespeare's time.

Gordon, G. S. Shakespeare's English. Society for Pure English Tracts, No. 29. Oxford, 1928. Society for Characteristics of Shakespeare's language and its influence on ours.

GRANVILLE-BARKER, HARLEY. Prefaces to Shake vick, First Series, 1927. Second Third Series, 1936. Discussions of speare. Sidgwick, Series, 1930. plays from point of view of theatrical producer. NAYLOR, E. W. Shakespeare and Music. Dutton,

Shakespeare's knowledge of music and his 1931. use of it in his plays.

PARROTT, THOMAS MARC. William Shakespeare. 1935. Facts about Shakespeare's life, Oxford, times, and works written for college freshmen.

SMITH, LOGAN PEARSALL. On Reading Shakespeare. Harcourt, 1933. An essay on the greatness of Shakespeare's literary achievement, written by a modern writer who set out to prove that Shakespeare's plays are overrated.

Books for Teachers

Bradby, Anne. Shakespeare Criticism, 1919-1935.
The World's Classics Series. Oxford, 1936. A selection from the writings of modern critics about

CHAMBERS, E. K. The Elizabethan Stage. 4 vols. Oxford, 1923. Most authoritative reference book on the plays and theaters of Shakespeare's time. William Shakespeare. 2 vols. Oxford, 1930. Most authoritative reference book on the man and his work.

HARTLEY, DOROTHY, and ELLIOT, MARGARET M.

The Life and Work of the People of England.

Vol. II (1500-1800). Putnam, 1926. A pictorial record from contemporary sources. Nearly 500

illustrations from contemporary life.

KAUFMAN, PAUL. Outline Guide to Shakespeare.

Century, 1924. Convenient list of facts about Shakespeare and his plays.

LAMBORN, E. A. G. and HARRISON, G. B. Shake-speare, the Man and His Stage. Oxford, 1923. Good elementary discussion of the man and hiswork.

work.

ODELL, GEORGE C. D. Shakespeare from Betterton to Irving. 2 vols. Scribner, 1920. Records of performances of Shakespeare's plays.

SMITH, D. NICHOL. Shakespeare Criticism. The World's Classics Series. Oxford, 1916. Selections from the writings of critics about Shakespeare, 1616-1016.

THORNDIKE, A. H. Shakespeare's Theater. Macmillan, 1916. London theaters of Shakespeare's time and their use.

TOLMAN, ALBERT H.
2 vols. University Questions on Shakespeare. University of Chicago Press, 1912. A series of questions on the plays.

WILSON, J. DOVER. Life in Shakespeare's England. Macmillan, 1911. Illustrative material from contemporary documents.

Outline

I. Greatest Dramatist of All Time

- (1) Qualities of his genius
- (2) Influence on the English language

II. Shakespeare's Life

- Early years (I)
- (2)Marriage
- Actor and playwright (3)
- Poet (4)
- Theater companies
- Financial success
- Activities (7)
- (8) Later years
- Portraits

III. Shakespeare's Works

- (1) Periods of development
 - Types of plays
 - (a) Histories
 - (b) Tragedies
 - Comedies (c)
- Plots
- Characters
- Famous quotations
- Nondramatic works
 - (a) Narrative poems
 - (b) Sonnets
- Theories of authorship

IV. Shakespeare, a Man of His Own Time

- Great Elizabethans
- (2) London of Shakespeare's day
- (3) Influence of the new world
- The audience (4)
- (5) Music
- (6) Theaters
- (7) Stage properties and costumes
- (8) Women's parts

V. Editions of Shakespeare

- (1) First quarto
- (2) First folio
- Later edition (3)
- (4) Popular editions

VI. Shakespeare through the Ages

VII. Memorials

Questions

What qualities of Shakespeare's genius have caused him to be considered the greatest dramatist the world has ever known?

Who were some of the great literary giants who paid a tribute to his talents?

In what way did Shakespeare have an important influence on the English language?

How was Shakespeare able to portray such a wide range of characters with fitting emotions, speech, and conduct for each?

What accounts for the interest of all classes of people in Shakespeare's plays?

What was meant by David Garrick, the great Shakespearean actor, when he said "Ye children of nature of fashion and whim, he painted you all, all join to praise him"?

Into how many groups are Shakespeare's plays usually divided? What are they?

In what ways may the great dramatist be described as a man of his own time?

What other great men lived in England during Shakespeare's lifetime?

How did the playhouse of Shakespeare's day differ from a modern theater? What effect did this have on the playwright as he wrote the play?

Why was so much music used in Shakespeare's plays?

Which are usually considered the two greatest of Shakespeare's nondramatic works?

How many sonnets is Shakespeare thought to have written in all?

Why has there been any controversy about the authorship of the plays?

What did Ralph Waldo Emerson mean in the following lines:

England's genius filled all measure

of heart and soul, of strength and pleasure.

Gave to the mind its emperor And life was larger than before

Nor sequent centuries could hit Orbit and sum of Shakespeare's wit

For men who lived with him became

Poets, for the air was Fame.

How did the writer, William Winter, sum up Shakespeare's great talent in this stanza:

There is not anything of human trial

That ever love deplored or sorrow knew No glad fulfillment and no sad denial

Beyond the pictured truth that Shakespeare drew.

SHAKING QUAKERS. See SHAKERS.

SHALE, a sedimentary rock having a laminated structure, and containing a large proportion of alumina. Shale was deposited on the bottoms of lakes and other bodies of water in past geological ages, and hardened into rock when the water was drained. It thus usually breaks into slabs parallel to the bedding planes. Under heat and pressure, shale in some localities has been changed into slate (see METAMORPH-ISM). Shale is one of the most common rocks of the coal measures, and it often contains valuable fossils. Bituminous shale burns with a flame; some bituminous shales contain petroleum, which is extracted by distillation. Shale is used to make portland cement, is frequently ground up to make material for bricks, and is sometimes used in road building. Alum shale is a source of alum (which see).

SHALER, NATHANIEL SOUTHGATE (1841-1906), an American geologist, educator, and author, was born in Newport, Ky. After graduation, in 1862, from the Lawrence Scientific School of Harvard University, he served two years as Federal artillery officer in the Civil War. In 1868 he became professor of paleontology at Harvard, full professor of geology in 1887, and dean of the Lawrence Scientific School, four years later. From 1873 to 1880, he had charge of the geological survey of Kentucky, and in 1884 joined the staff of the United States Geological Survey of the Atlantic Coast division.

Shaler's Writings include A Study of Life and Death, Sea and Land, First Book in Geology, Outlines of the Earth's History, and Man and the Earth.

SHALMANESER, shal mah ne' zur. See Jehu.

SHAMAN, shah' man. See SHAMANISM; INDIANS, AMERICAN (Indian Thought).

SHAMANISM, shah' man iz'm, a religion practiced by primitive peoples, based on the belief that the shaman, or witch doctor, can exorcise demons and spirits, and so ward off evil and bring good to the persons for whom he performs his incantations. The ceremonies consist of weird feasts, dances, sorceries, etc., treatment in the case of the sick often being combined with the giving of medicinal herbs. This name was originally applied to the religion of the tribes of Northern Europe and Asia, but the North American Indians, with their "medicine man" and his uncanny rites, have similar beliefs concerning unseen spirits. See Indians (Indian Thought).

SHAMOKIN, shah mo' kin, PA. See PENN-SYLVANIA (back of map).

SHAMROCK. Always thought of in connection with Ireland, of which it is the national emblem, the shamrock is usually identified with the white clover. A familiar poem says: "There's a dear little plant that grows in our isle—

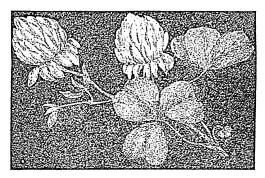
'Twas Saint Patrick himself sure that set it;

And the sun on his labors with pleasure did smile, And with dew from his eye often wet it.

It shines through the bog, through the marsh, and the mireland,

And he called it the dear little shamrock of Ireland."

On the British coat of arms are pictured the thistle, the rose, and the shamrock growing on one stalk, for these are, respectively, the emblems of Scotland, England, and Ireland. The clover believed to be the shamrock has leaves



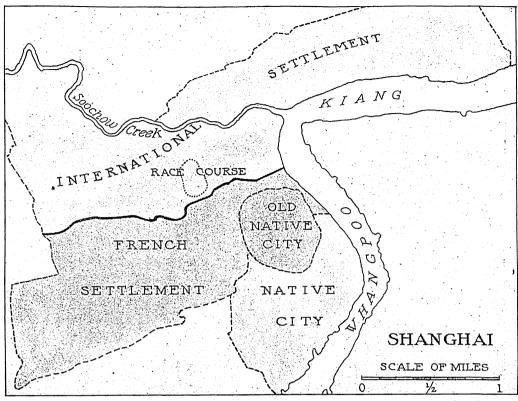
O, the Shamrock, the green, immortal Shamrock!
Chosen leaf
Of Bard and Chief,
Old Erin's native Shamrock.
—Moore: O, the Shamrock.

of a beautiful blue-green color, each made up of three leaflets (see panel illustration of the article IRELAND). Saint Patrick, so the story goes, chose this emblem because the three leaflets were symbolic of the Trinity. Some authorities say that the wood sorrel, whose leaves are very much like those of the white clover, is the true shamrock, and others give the honor to a plant which belongs to the same genus as alfalfa. It is known variously as black medic, nonesuch, yellow trefoil, and hop clover.

B.M.D.

SHANGHAI, shang' hi, China's greatest commercial port, the most cosmopolitan city in that country, and one of the eight greatest ports of the world. It is located close to the sea on the Whangpoo River, in the delta of the Yangtze, which has a watershed of 750,000 square miles, supporting 180,000,000 people, for whom Shanghai is, and for geographic reasons must remain, the only important seaport. Kiangsu province, in which the city lies, has a population (estimated) of 35,000,000, about 900 persons to each of its 38,610 square miles, the most densely populated urbanrural area in the world.

Shanghai is not one city but three—the Greater Municipality of Shanghai, administered solely by Chinese; the International Settlement, administered jointly by foreigners and Chinese; and the French Concession (or Settlement), administered by the French consul-general. The population of the Chinese Municipality

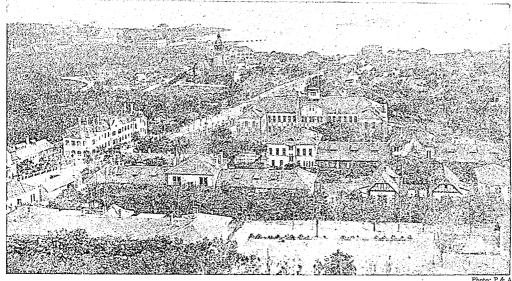


NATIVE AND FOREIGN SECTIONS OF SHANGHAI BEFORE THE JAPANESE OCCUPATION (1937)

is 1,700,000; of the International Settlement, 1,000,000; and of the French Concession, 435,000. Of these totals, 10,000 in the Chinese area, 27,000 in the Settlement, and 12,500 in the Concession—nearly 50,000 out of a total of 3,489,998 (1936 estimate)—are foreigners, the remainder Chinese. Of the foreigners, nearly 19,000 were Japanese prior to the bombardment of the Chapei area in January, 1932. About 8,500 are British, 3,000 Americans, 7,500 Russians, 1,400 French, and 1,400 Germans.

The International Settlement was created as a British Settlement under so-called Land Regulations of 1845. In 1863 a similar American area to the north and east was joined with the British, the French area remaining separate. In 1899 the Settlement area was extended to a total of 8% square miles. The French Concession covers 3.94 square miles. In addition, foreign jurisdiction extends over certain "External Roads Areas," covering 12.4 square miles, with a mixed population of whom 9,500 are foreigners. Since 1854 the International Settlement has been governed by a council elected by foreign rate-payers, but in 1928 Chinese representatives were added. Today the Council consists of fourteen members, five of whom are Chinese. The Chinese are represented also on the Advisory Commission of the French Concession. The Chinese Municipality is governed by a mayor appointed by the National Government. Foreign defendants, citizens of countries enjoying the privilege of extraterritoriality, are under the jurisdiction of consular courts, while Chinese and non-privileged foreigners are actionable in Chinese courts established in the two foreign areas and in the Chinese Municipality. Foreigners may not hold full title to land but may obtain long-term leaseholds from the local Chinese authorities through their respective consuls. The foreign status depends in part upon treaty, in part upon local arrangements, in part upon prescription. Chinese sovereignty is not surrendered, though actual administration of the foreign areas is controlled by foreigners.

Both settlements are mixed business and residential areas, the French being the more largely residential. Wide well-paved and well-lighted streets and handsome clubs, hotels, business and municipal buildings distinguish these areas, while the Chinese Municipality, though in general quite modernized, retains more of the aspect of old China. Nanking Road, main thoroughfare of the International Settlement, displays by night a striking variety of colored neon lights, resembling other "Broadways" in Western cities. The bund or water-front is a fine esplanade flanked at one end by an attractive public garden, from which



TSINGTAO, THE GERMAN BUILT PORT OF THE PROVINCE OF SHANTUNG

generating 90,000 horse power, were completed, the installation of three others was carried forward, and the project completed at the end of

the year. See IRELAND (The Waters of Ireland). SHANS, shahnz. See BURMA (The People and Their Civilization).

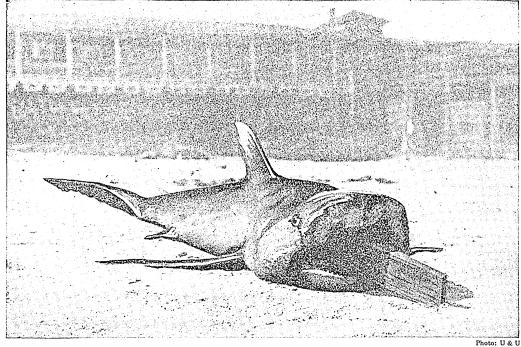
the observer may view a steady procession of great ocean liners, river steamers, junks, and sampans, and at times an ominous line of foreign naval craft at anchor. Industrially, the city is notable for its two and a quarter million cotton spindles, its sixty-six silk filatures, its fifty-five engineering works, and its five shipyards.

Shanghai became the focus of world interest when, on January 28, 1932, Japanese marines sought to occupy Chapei, a section of the Chinese Municipality, as a gesture to terminate a boycott induced by difficulties in Manchuria. Severe fighting ensued, the Japanese resorting to bombing, which drove 200,000 people from their homes and destroyed the Commercial Press, largest publishing house in the world. Previously, in 1925 and 1927, Great Britain, France, and the United States landed troops in the city to protect foreign interests, fearing lest radical nationalism should provoke attacks. Chinese sentiment in Shanghai, however, tends, because of its essentially commercial basis, to be in general conservative. The city was occupied by Japanese troops in November, 1937. See China.

SHANNON, shan'un, RIVER, the principal waterway of Ireland and the longest in the United Kingdom, which flows with sluggish current for about 250 miles, through a country famous in literature. It rises at the base of Mount Cuilcagh, in county Cavan, and flows in a southwesterly direction through a series of beautiful lakes, or loughs, emptying into the Atlantic Ocean between Loop and Kerry headlands.

A project to utilize the resources of the Shannon for electrical power was begun in 1925. By 1929, three turbines, capable of

SHANTUNG, shahn toong', one of the coastal provinces of the Chinese republic, including a mountainous peninsula projecting eastward into the Yellow Sea. Shantung province is one of the most densely populated spots in China. Within an area of 55,970 square miles, there are about 30,000,000 people. In 1897 Germany seized its port, Kiaochow, in compensation for murders of missionaries, and strongly fortifying, developing, and improving the lease, intended never to relinquish it. During the World War, in 1914, it was captured by British and Japanese forces, and turned over to Japan for administration, with the understanding that it should be returned to the Chinese government at the close of the war. The next year Japan forced China to agree to accept any settlement reached at the peace conference, regarding Germany's political and economic rights in Shantung. China's objection to Japanese control of the peninsula was one of the problems of the Versailles Peace Conference in 1919, at which time Japan's possession was confirmed. The Chinese refused to sign the treaty and initiated an anti-Japanese boycott in China. The United States Congress made a protest against this decision of the treaty, and it became a live topic in the limitation of armaments conference at Washington, in 1921-1922, when Japan was induced to return the concessions and leases to China. In 1938, during their invasion of China, the Japanese again occupied Shantung. See CHINA.



AN EXCELLENT REASON WHY SWIMMER'S SHOULD KEEP CLOSE TO THE SHORE

The illustration is that of a man-eating shark eighteen feet in length, killed within a few hundred yards of the warm surf of a famous Southern winter resort. Such a ferocious fish seldom approaches close inshore, but the swimmer who goes beyond the zone of safety is in imminent danger. The shark shown above has a plank eight inches wide in its mouth, which it is obvious could be opened much wider. [See page 6543.]

Coal and iron are mined. Among the greatest sources of wealth are pongee silk and "Shan-

tung" silk, the latter made from socalled "wild silk," the product of silkworms that are fed on oak leaves, in places where the mulberry does not thrive. Agriculture is the principal industry, and the chief products are millet, corn, barley, sorghum, maize, beans, peas, cotton, and tobacco; more recently, peanuts have proved a profitable crop. Oil from soy beans has become a valuable export. Glass The location of the jaws, with the three rows of jagged teeth work, pottery- in the lower jaw, shows why the fish must turn on its side before attacking its victim. [See page 6543.]

making, mining, and paper and cotton manufacture are industries which have been particularly developed in recent years. Railways and communications

are being extended, and hundreds of miles of motor roads have been built.

In 1898 the district of Weihaiwei was leased to Great Britain; it was restored to China in 1930. This territory, embracing about 285 square miles, includes the walled town of Weihaiwei, adjacent waters in the bay, and several islands.

The capital city of the province, Tsinan, with a population of about 300,000, has a modern portion with wide streets, modern shops and residences, and the Shantung Christian University, which is one of the largest international universities in China.

THE MOUTH OF A NEW ZEALAND SHARK

SHARES, a certain number of equal portions into which capital stock is divided. See STOCK, CAPITAL.



MOUNT SHASTA, CAPPED BY ETERNAL SNOW

SHARK. Our familiar expression of contempt-"loan shark"-suggests the characteristics of these large, flesh-eating fish of the deep seas. Sharks are the most voracious of marine animals. They are found in all parts of the ocean, but are most abundant in warm regions. Their rounded, tapering bodies, which sometimes reach a length of forty feet or more, have no scales, but are covered with rough, horny skin, commercially called *shagreen*. This is sometimes used in place of sandpaper for polishing. The mouth is on the under side of the head, and the animal usually will turn nearly upon its back, while seizing a floating object, to avoid exposing its long snout above the water. Some species have several rows of long, sharp teeth, all but one of which are folded back on the jaws. As each tooth wears out, another grows to take its place. Other species have broad, flat teeth, and, in a few varieties, they are small. The gills of sharks communicate with the surface by several openings, and these are on the sides of the body. The tail is generally unequally notched. Sharks are rapid swimmers, and frequently follow vessels for days at a time to secure food and waste matter thrown from them. They devour small fish of all kinds and do considerable damage to the food-fish supply.

The largest species is the whale shark, often over fifty feet long. Next in size is the harmless basking shark, found chiefly in the Arctic Ocean, and so called because it is known to bask in the sun on the surface of the water. One of the best-known species is the white shark, a man-eater living in tropical seas and sometimes found off the southern coasts of the United States. The blue shark, named from its color, also preys on man; this gluttonous fish often follows its prey into nets of fishermen.

Some of the sharks are called hammerheads because the head is shaped like a hammer, with the eyes at either end. Among many other species are the dusky, porbeagle, spinous, angel, and dog sharks. There are a number of families of sharks, all of which belong in the same order, the Selachii. See illustrations, page 6542.

the Selachii. See illustrations, page 6542.
The Shark in Industry. The Norwegians have long specialized in shark-fishing, and the exploitation of these fish is the basis of several thriving industries of Norway. The heads of these creatures are worked up into glue; the flesh makes a good fertilizer; leather is manufactured from their hides, and "cod-liver" oil from their livers. Shark fisheries have also been established on the Florida and Gulf coasts, along the Virgin Islands, and along the Pacific coast off British Columbia. The fish are caught in huge tarred nets 600 yards long. By a process of tanning, perfected at the Pratt Institute, Brooklyn, N. Y., a high-grade waterproof leather is being manufactured from shark skins that will relieve the shortage of leather made from cattle hides. The flesh of some species of shark is used as food, but shark flesh has not come into general use in America, where fish of much finer flavor are abundant. Dried shark fins are considered a great delicacy in China, and much flesh is salted and exported to parts

of Africa, where it is used as food.

SHARON, shair' on, PA. See PENNSYL-VANIA (back of map).

SHARON, PLAIN OF. See PALESTINE (The Land).

SHARON, ROSE OF. See HIBISCUS.

SHARPS AND FLATS. See Music (A Lesson on the Major Scale).

SHASTA, MOUNT. In the Cascade Mountains, north of the Sierra Nevada range of California, there rises a lofty, snow-covered,

conical mountain, which towers to a height of over 10,000 feet above the plains of the Sacramento Valley. This is Mount Shasta.

Though its altitude of 14,380 feet is lower than that of several other peaks of the United States, Shasta has a more dominating appearance, for even Mount Whitney (14,496 feet) rises only about 3,000 feet above its base.

Mount Shasta is a typical volcanic mountain, and a product of the great volcanic activity to which the whole Sierra Nevada range was subjected in the remote past. The western of Mount Shasta's two peaks, 12,000 feet high, known as Crater Peak, or Shastina, has at its top a crater about three fourths of a mile in diameter and 2,500 feet in depth.

On the northern slope of the mountain are several glaciers, some of considerable size. A number of these are found at as low an altitude as 9,500 feet. The numerous large glaciers which once covered the summits of the Sierra Nevadas have left indelible evidence in the numerous valleys and amphitheaters, with their towering walls, and in the thousands of glacial lakes and ponds. See California (Surface

Directly below Mount Shasta is being erected Shasta Dam, the second highest such structure in the world. It will be a powerful factor in irrigation, flood control, and reclamation.

SHASTA DAISY. See BURBANK, LUTHER; DAISY.

SHAT-EL-ARAB, shaht el ah rahb'. Tigris River.

SHAUGHNESSY, shaw' ne sie, Thomas George, first Baron (1853-1923), a Canadian railroad executive, president of the Canadian Pacific Railway. Shaughnessy was born at Milwaukee, Wis. At the age of sixteen, he began railroading with the old Milwaukee & Saint Paul Railway, and later with the Chicago, Milwaukee & Saint Paul (now the Chicago, Milwaukee, Saint Paul & Pacific). In 1882 he entered the employ of the Canadian Pacific Railway as general purchasing agent. Later, he became, in turn, assistant general manager, assistant to the president, vice-president, and finally, in 1808, president. His prominence in railroad affairs led to his election as officer or director in various industrial and financial corporations. He was knighted in 1901, and in 1916 was raised to the peerage as Baron Shaughnessy of Montreal (Canada) and Ashford (County Limerick, Ireland).

SHAW, ALBERT (1857-), the founder and editor of the American Review of Reviews, was born at Shandon, O., was graduated at Iowa College (now Grinnell) in 1879, and spent several years as an editorial writer on the Minneapolis Tribune. He was later a professor of international law at Cornell University, after which he began his settled career on the Review of Reviews, in 1891. Since that time,

he has proved that, as an editor of a currentevents magazine, he has few equals. He has also an established reputation as a writer

on economics and municipal government, and as a lecturer. He was president of the original chapter of Phi Beta Kappa, at William and Mary College.

In the Field of Books. Shaw is the author of Icaria-a Chapter in the History of Communism; Local Government in Illinois; Coöperation in the Northwest; Municipal Government in Great Britain; Municipal Government in Continental Europe; The Business Career; Political Problems of American Development; The Outlook of the Average Man; A Cartoon History of Roosevelt's Career, and Abraham Lincoln.



ALBERT SHAW

SHAW, ANNA HOWARD (1847-1919), an American physician, minister, lecturer, and writer, active in many fields, but especially

identified with the woman-suffrage movement. Though born in England, at Newcastle-on-Tyne, she resided in America from early childhood, and was educated at Albion (Mich.) College and at the Boston University schools of theology and medicine. She held the degree of doctor of medicine. and was a regularly? ordained minister, having received ordination



ANNA HOWARD SHAW from the Protestant

Methodist Church, in New York, in 1880. Dr. Shaw was pastor of Methodist Episcopal churches in Massachusetts for a number of years, but the rules of that denomination forbade her receiving ordination to its ministry. From 1886 to 1904, she was national lecturer for the National American Woman's Suffrage Association, and was its president from 1904 until 1915. In the latter year, she resigned that she might devote her energies to an active campaign for the enfranchisement of women. Afterward, she became honorary president of the national organization. In 1915 she published her autobiography, The Story of a Pioneer.

SHAW, GEORGE BERNARD (1856-), a British dramatist, novelist, and critic, born at Dublin, Ireland. He attended school in his native city, but his education was not very extensive, for by his fifteenth year he had begun to earn his own living. In 1876 he went with his family to London, where he did office work of various kinds, until able to support himself by literary work. Shaw was much

interested in socialism. and used his talents in every way possible to advance it, speaking on street corners and contributing articles to magazines. He developed into one of the foremost debaters in England, and was an active member of the Fabian Society. He made socialism the central theme of his early novels-The Irrational Knot, Love Among the Artists, Cashel Byron's Pro-



Photo: U & U

GEORGE BERNARD SHAW

fession, and An Unsocial Socialist; they met with only a fair reception, but his dramatic and musical articles for various London journals had a large following, and his defense of Ibsen and of Wagner in The Quintessence of Ibsen and The Perfect Wagnerite attracted wide attention. In 1928 he published The Intelligent Woman's Guide to Socialism, a summary of his views. Adventures of the Black Girl in Her Search for God is a satiric fable about religion.

As a Dramatist. Shaw's dramas, distinguished for wit and pungent satire, are as effective when read as when presented on the stage. They include Mrs. Warren's Profession, Candida, The Devil's Disciple, Man and Superman, Back to Methuselah, Saint Joan, The Apple Cart, and Too True to be Good. His plays have a universal application. An operetta, The Chocolate Soldier, was adapted from his Arms and the Man. In 1938 he arranged for motion-picture production of his plays, beginning with Pygmalion.

SHAW, HENRY. See BOTANICAL GARDEN. SHAW, HENRY WHEELER (1818-1885), an American humorist, more familiarly known by his pen name Josh Billings, was born at Lanesborough, Mass. He attended Hamilton College for a year, but left school to go West, where he lived for over twenty years. Returning in 1858 to Poughkeepsie, N. Y., he wrote humorous articles for newspapers in that city, but was little noticed at first. When he began to use queer "backwoods" diction, spelling words to sound just as he pronounced them, his articles became immensely popular. On the public platform, his droll sayings and quaint moral lectures made him very successful.

What He Wrote. In 1860 his first book, Sayings of "Josh Billings," was published. This was followed by Every Boddy's Friend, Josh Billings' Trump Kards, Josh Billings' Spice Box, and Josh Billings' Farmers' Allminax.

SHAW, THOMAS ED-WARD (1888-1935), British aviator and author, was born in Wales, and educated at Oxford. In 1927 he legally changed his family name of Lawrence to Shaw, the surname of his friend Bernard Shaw. He enlisted as a private soldier in the British Air Force, and became "uncrowned King of Arabia," Colonel Lawrence, who organized the desert revolt, and



HENRY WHEELER SHAW "Josh Billings."

spoke for the Arabs at the Peace Conference. Aircraftsman Shaw, however, was unable to obliterate the legendary mystery of Lawrence. His writings include *The Seven Pillars of Wisdom* and *Revolt in the Desert*.

SHAWLS, CASHMERE. See CASHMERE GOAT; KASHMIR.

SHAWNEE, OKLA. See OKLAHOMA (back of map).

SHAWNEE INDIANS. See Indians, American (Most Important Tribes).

SHAYS' REBELLION, an uprising in 1786-1787 in Western Massachusetts, based upon the discontent over financial conditions at the close of the Revolutionary War. Excessive salaries of office-holders, abuses in the administration, and the exorbitant land taxation were the principal grievances. About 600 insurgents, under Daniel Shays, gathered at Springfield in September, 1786, and intimidated the supreme court, which adjourned after three days. Disturbances continued, and on January 25, 1787, Shays led an army of 2,000 men against the Federal arsenal at Springfield. The state militia soon overwhelmed them, and by the end of February, the revolt was quelled. Fourteen of the ringleaders were sentenced to death, but they were pardoned, later, by John Hancock.

SHCHEDRIN, shched' reen, NIKOLAI. See RUSSIAN LITERATURE (Saltykov, Mikhail). SHEARER, NORMA. See MOVING PICTURES

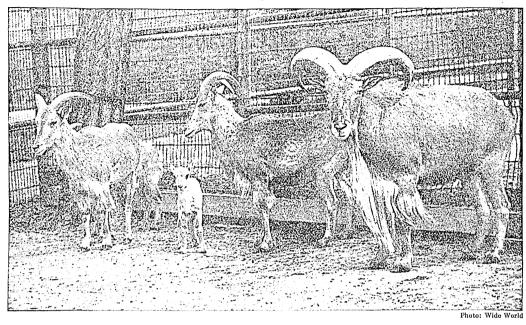
(The Players).

SHEARING STRENGTH. See STRENGTH
OF MATERIALS.

SHEATHING. See CARPENTRY.

SHEBA, QUEEN OF. See ETHIOPIA; SOLOMON SHEBOYGAN, WIS. See WISCONSIN (back of map).

SHECHEM, she' kem, one of the Cities of Refuge (which see).



Tamed after a lifetime of making their home in a zoo, members of this sleepy, well-cared-for family resemble their wild forefathers only in appearance.

SHEEP. Sheep are among the most useful of domesticated animals, and also among the first that mankind brought under control. Their earliest subjugation, in fact, occurred in prehistoric times. The importance of sheep in the life of the Hebrews is familiar to all readers of Biblical story, as well as the special associations centering about the lamb, which was always an emblem of innocence and purity. Sheep, too, are contrasted with goats in the parable of the Last Judgment, a distinction that has made its way into current speech.

But the docile member of the domesticated flock is quite unlike the animal in the wild state. A creature of the mountains and elevated plateaus of the northern hemisphere, the wild sheep is high-spirited, venturesome, and self-reliant, braving the fiercest storms of winter and capable of climbing to precipitous heights that no other animals but mountain goats dare ascend. Ordinarily, however, sheep prefer the slopes and open spaces in the mountains, rather than the rugged cliffs, and, like the domesticated breeds of today, they run together in bands. The life span of sheep is about thirteen years. They bear their first young at the age of one year and every year thereafter. The gestation (which see) period is approximately five months.

In appearance, wild sheep greatly resemble wild goats, and some species are thought to be intermediate between the two groups. Generally speaking, sheep lack the beard found on

the chin of the male goat, as well as the well-known "goaty" odor. Most sheep possess a gland between the two middle toes, which typical goats lack. The horns of the male sheep, which is called a ram, usually curve outward. Of course, the domesticated animals are readily distinguished, for modern sheep are radically different from their wild progenitors. The coarse hair that covers the wild sheep is replaced by a soft coat of wool under domestication, and the horns have largely disappeared. In some breeds, however, both rams and ewes, or females, are horned; in others, the rams alone bear these appendages. The illustration on this page shows the typical appearance of wild sheep.

The lofty plateau and mountain region of Central Asia is supposed to be the original home of the sheep tribe. The Altai Mountains of Siberia and Mongolia harbor the largest of all wild sheep, the argali. The male stands four feet high at the shoulders, and his massive horns curve into a spiral twenty inches in circumference. On the plateau of Pamir, the "roof of the world," at an elevation of three miles, lives the great Marco Polo sheep, first described by the enterprising traveler for whom it is named. Little smaller than the argali, the Marco Polo is remarkable for the enormous spread of its horns, and is altogether a magnificent specimen of wild life. Tibet is the home of the blue sheep, or bharal, which is closely allied to the goats. Asia possesses half a dozen other forms of wild sheep, and

North Africa has one in the aoudad: a goatlike species with long hair on the breast and forelegs. The mouflon, of Corsica and Sardinia, is the only wild sheep now found in Europe. In North America are several varieties of the bighorn (which see).

Domestication and Uses. There is a long history of cross-breeding and selection back of domesticated sheep. Some authorities trace our present breeds to the argali and the mouflon of Cyprus, but nothing definite on this point is known. Originally, wild sheep were tamed for the sake of their hides and milk, and were used as burdenbearers. Very early, however, they became important for their fleece, which has attained its present qualities as a result of care, adaptation to climate, and scientific breeding. In the writings of the ancient Romans, there are references to the manufacture of woolen cloth, but the improvement of

sheep for the production of lamb and mutton is a matter of comparatively recent date. Only in the last two centuries have breeders developed animals of a distinctly mut-ton type. Sheep ton type. bred primarily for their meat tend to have coarser wool than those of the wool type. According to the character of the fleece, sheep are classified under three types, namely, long-wooled, medium-wooled, and fine-wooled. Besides wool, meat, and leather, which is made from the hide, sheep yield various by-products, such as glue, tallow, suet, soap, fertilizer, and catgut.

Important Domestic Breeds. The Spanish Merino, which was developed in its native country centuries ago, is the basis of the fine-wooled breeds throughout the world. Sheep having Merino blood outnumber those of any other variety, but the origi-nal Spanish breed is inferior to the improved stock that has been produced in other countries, notably the United States. American Merinos are the best in the world. There are several types, but all of these sheep have white faces and legs, and are densely clothed

Photo: Live Stock Photo C

FOUR PRIZE-WINNERS

⁽¹⁾ Champion Shropshire.

⁽²⁾ Champion Southdown.

⁽³⁾ Champion Hampshire ewe.

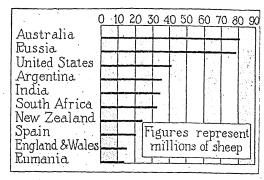
⁽⁴⁾ Champion Rambouillet

with fine wool, down to the toes and end of the nose. The rams usually have horns. Merinos tend to develop large folds of skin about the neck and shoulders, and some types have body wrinkles. Among these sheep are the Delaine type, from whose wool the well-known woolen cloth of that name is derived. There are large flocks of pure-bred Merinos in Ohio and surrounding states, and great numbers of sheep of mixed Merino pedigree on the large ranches of the Western states. Merinos are also important in Australia and South America, and in Germany and France.

Another breed descended from the Spanish Merino is the Rambouillet (page 89); it was developed in France. Rambouillets are larger than the original stock, have longer fleece and better mutton conformation. The first sheep of this breed brought to America were imported in 1840. The breed has grown steadily in favor, being especially popular on the Western ranges of both the United States and Canada.

England is the native home of three important long-wooled breeds—the Lincoln, Leicester, and Cotswold. Lincoln sheep have become popular on ranges in various parts of the world, including Australia, Argentina, and the Western United States. They are among the largest of domesticated sheep, and produce the longest fleece. The Leicester sheep is especially valued by stock-breeders for crossing with other sheep, and is the progenitor of most of the other long-wooled breeds. American ranchmen have also made use of

The leading mutton breeds are the Shropshire, Southdown, Hampshire Down, and Dorset Horn, all of English origin. The Shropshire is the most valuable of these breeds, since it combines good quality of

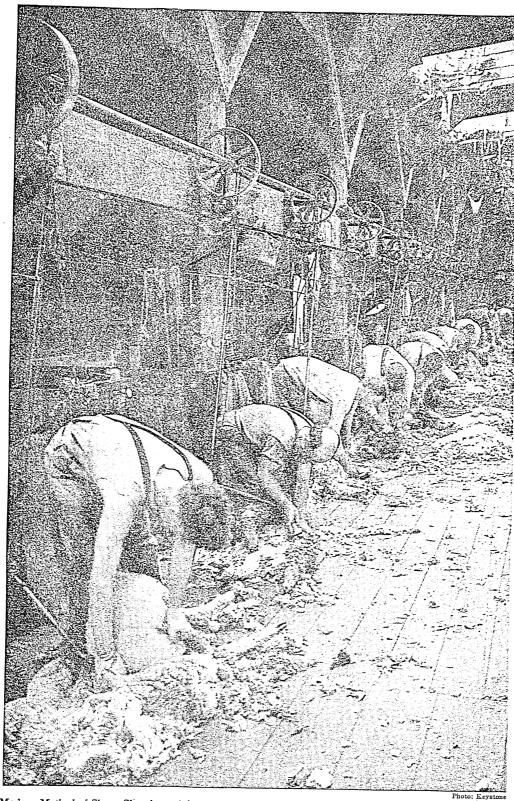


THE SHEEP OF THE WORLD

The ten countries showing greatest production.

fleece with superior mutton production. The wool clothes the whole body, forming a cap over the head. Shropshires are widely distributed over the world, and are much used by American and Canadian sheepmen for improving ordinary stock. The Southdown, which originated in the English South Downs, in Sussex, produces a high grade of lamb and mutton, but has been less popular in America than the Shropshire, because of its small size and light yield of wool. It is a good sheep for small flocks on general farms, and ought to





Modern Method of Sheep-Shearing. A battery of power-driven shears marks a great advancement over the one-man hand process formerly employed. Such equipment as is shown above, however, can be used only on great ranches where there are thousands of sheep.

6549

grow in favor. Southdowns in North America are found in greatest numbers in the Eastern and Southern states, and in Ontario.

The Dorset Horn breed is notable in that both rams and ewes are horned. Dorset Horns are white-faced sheep of distinctly mutton type, with wool of medium length. In the United States, they are most popular in New York and Pennsylvania. Out-of-season lamb is a standard product of Dorset Horns, since the lambs born in the fall are found on the Easter market. The Hampshire

Down, which is distinguished by the dark coloring of the face, ears, and legs, is a large mutton sheep that has been developed by crossing with Southdowns. It is widely distributed in the United States and Canada, where it is greatly favored by breeders for improving the mutton of common stock.

World Production. The leading sheep-raising countries are listed on the accompanying graphic. There are about 40,000,000 sheep on American farms and ranges, a considerable decrease since the be-

ginning of the century. The most important sheep states (which vary in rank from year to year) are Texas, California, Montana, Wyoning, Idaho, Colorado, Utah, New Mexico, Oregon, and Ohio. Since 1870, sheep in greatest number have been found west of the Mississippi. Wool sheep predominate in the West, in Ohio, and a few other sections, and mutton sheep elsewhere, though the latter have been introduced into practically all parts of the country. The United States nearly takes care of its home needs in regard to lamb and mutton, but imports about its own production of wool (see Wool). Mutton sheep also predominate in Canada. About half the pure-breds there are Shropshires.

Classification. Sheep belong to the order Ungulata, or hoofed mammals, and to the family Boridae, or hollow-horned ruminants (cud-chewers). They are grouped with goats in the subfamily Caprinae. Domesticated sheep and most of the wild species are placed in the genus Oris, the domesticated species being called Oris aries.

Related Subjects. For the various diseases and pests of sheep, see the articles Bottly; Foot and Mouth Disease; Mange; Mittes; Tick. See also Meat and Meat Packing; Mutton; Karakul Sheep.

SHEEP, ROCKY MOUNTAIN. See BIGHORN.

SHEEP DOG. See Collie; Shepherd Dog. SHEEP LAUREL, law' rel. See Kalma.

SHEEPSKIN. See Buckskin.

SHEEP TICK. See TICK. SHEET, in geology. See Igneous Rocks. SHEFFIELD, shef' celd, a city in the West

SHEFFIELD, shef' celd, a city in the West Riding of Yorkshire, England, about 160 miles northwest of London. It was celebrated for hundreds of years as the manufacturing center of the world's finest cutlery, but today, cutlery made in other parts of the world equals Sheffield's in quality of product, if it does not

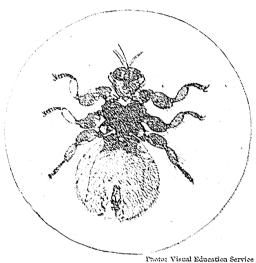
excel in quantity. Iron was smelted in the district in Roman times; Chaucer, in the Canterbury Tales, refers to knives of Sheffield. Besides the thriving cutlery establishments, the city has factories producing many other standard articles.

The city is pleasantly situated on wooded slopes surrounding the point where the River Sheaf meets the Don, and is a municipality of 511,757 (1931) inhabitants. The working people are excellently provided for in Sheffield, with public baths, free libraries, parks, and

technical schools. The city has a university, founded in 1008. The Cathedral of St. Peter and St. Paul, damaged by bombing during World War II, dates from the reign of Henry I. In an old castle of Sheffield, demolished in 1644, Mary, Queen of Scots, spent twelve years as a prisoner. The city was chartered by Edward I.

SHEIK, sheek, an Arabic title, used very loosely, but always meaning a venerable, aged man, or a chieftain. It may be the term applied to the head man of a village, the chief of a tribe, the leader of a religious order, or simply a person who is old and highly respected; its use down to this day is restricted, as it was centuries ago, to the Arabs and to their religion, Mohammedanism. The power of a sheik depends wholly upon the character and influence of the individual to whom the title is given. During the Nationalist uprising in Turkey, following World War I, the Sheikh ul Islam, or grand mufti, appealed to the Turkish population to support the sultan, but with little effect.

The sheik has been invested with a good deal of romance because of the glamour thrown about him by writers of fiction. The picture presented is largely false. As a matter of fact,



SHEEP TICK

the average sheik is often unkempt and dirty, and usually arrogant and cruel.

SHEKEL. This word, so frequently used in the Bible, meant most anciently a unit of weight, though later it referred as well to a coin. As a weight, it was first employed in Babylonia, but its use spread to the Phoenicians and the Hebrews, each of whom, however, modified its value. The Hebrew shekel, to which references are most common, weighed

about 253 grains. Intrinsically, the Hebrew gold shekel was worth about S10, the silver between sixty and seventy-five cents, though, of course, the purchasing power was far in advance of such sums to-day. For even while it was but a unit of weight, long before any Hebrew coins were minted, the shekel was used as a medium of exchange, uncoined ingots of gold or silver of known weight being employed.

In the time of Simon the Hasmonaean, the Jews first issued coins of their own, and it is thought probable that the first ones were struck about 139-138 B.C. This is by no means certain, however, as these early Jewish coins bear no date. The most important of these coins was the silver shekel, which weighed about 224 grains, and was about the same size as a United States cent. Upon one side was the representation of a chalice, probably a pot of manna,

with words whose English equivalent were Shekel of Israel; while on the other was the legend Jerusalem the Holy, surrounding a flower device, presumably Aaron's rod that budded. Half shekels were also coined.

In loose language of the present day, the term *shekel* has come to refer to money in general.

SHELBYVILLE, IND. See INDIANA (back of map).

SHELDON, CHARLES MONROE (1857-), an American clergyman and writer, best known as the author of *In His Steps*, a literal application of practical Christianity that caused much discussion when first published, in 1896. In 1900 he aroused widespread interest by editing the Topeka *Daily Capital* for one week, on what he felt were strictly Christian principles.

Sheldon was born at Wellsville, N. Y., educated at Brown University and Andover

Theological Seminary, and in 1886 was ordained in the Congregational ministry. From 1886 to 1888, he preached at Waterbury, Vt., and from 1889 to 1912, at Topeka, Kan. In the latter year, he resigned his pastorate to take part in an anti-saloon campaign in New Zealand. He resumed his Kansas pastorate in 1915, continuing in the work until 1919. From 1920 to 1925 he was editor-in-chief of the New York Christian Herald, and

since 1925 has been contributing editor of that journal. He is the editor of One Hundred and One Poems of the Day.

His Writings. In addition to In His Steps, Sheldon's books include The Crucifixion of Philip Strong, His Brother's Keeper, Lend a Hand, Who Killed Joe's Baby?, The Heart of the World, In His Steps Today, The Everyday Bible, Two Old Friends, Charles M. Sheldon—His Life and Story, and He Is Here.

SHELDRAKE. See Mer-GANSER.

SHELF, CONTINENTAL. See OCEAN (The Bed of the Ocean).

SHELL. Articles as prosaic as buttons and knife handles, as well as exquisitely delicate cameos, and objects quite as beautiful, we owe to certain groups of animals living in the sea. These articles are made from shell, which is the hard covering of the bodies of such creatures as the mollusks,

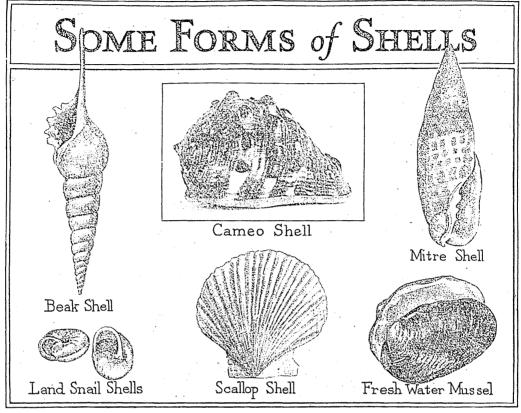
the typical shell-builders. Their shells are found not only along the ocean borders, and in the sands of the lake shores, but in low inland plains, in swamps, and even on high mountains. These animals build their shells not as bees make combs of wax; the fleshy covering of the body, or mantle, secretes lime from the water, and layer by layer the limy substance is added to the growing shell. The latter is protected from the corrosive action of acids in the water by a horny, outer skin and a pearly lining. The shells of mollusks are divided into two classes—the univalve, or those of one piece, and the bivalve, those consisting of two parts joined by a hinge.

Of the first class, the graceful spiral or wheel-like shells of the snails are most common, some being delicate, lustrous, and pearly, and others heavy, thick, and dull. The single-piece shells include also the rose-lipped covering of the conch, a mollusk abundant on the



A SHEIK OF THE DESERT





Florida coast; the cowrie shells which the child holds to his ear to hear the sound of the sea; the long spindle shells of the warm waters of the Pacific and the California shores; the handsome trumpet shells and giant whelks of the Atlantic; and the tiny rice shells and the helmet and cone shells of the Southern United States. Another interesting univalve mollusk is the chambered nautilus of the deep seas, beautifully described in the well-known poem by Oliver Wendell Holmes.

Clam and oyster shells are the most common bivalve shells. In the Indian and Pacific oceans, there is a giant clam with a shell two to three feet in diameter. Though the coats of crabs and lobsters are commonly called shells, these creatures do not secrete limy coverings. Their tough, hard crusts are composed of chitin.

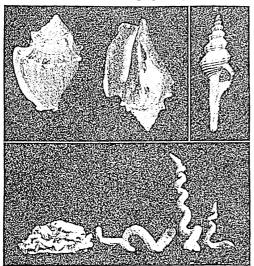
Uses of Shells. Buttons, buckles, knife handles, and many other articles are made from the pearly lining of the oyster shell, and a large amount of white pearl is also obtained from the fresh-water mussels of the Mississippi River, especially between Quincy, Ill., and Prairie du Chien, Wis., and in the adjacent waters. Over six billions of pearl buttons are annually manufactured in the United States. Mother-of-pearl is also extensively used for

inlaying fancy boxes, musical instruments, furniture and wall panels, and as a covering for opera glasses. Burned shells are a source of lime.

The beautiful greenish and rosy-hued abalone shell, found in the California coast waters, is combined with the white pearl in inlay work, and is also mounted in silver for jewelry or carved into cameos, and the large shells are used as ornaments. These abalones can be seen from the glass-bottomed boats near Catalina Island.

Pulverized conch shells are used in the manufacture of porcelain, and many of the large and beautiful varieties are prized as ornaments. A flat, thin shell found in the Pacific and Indian oceans, so transparent that print can be read through it, is commonly used in the Philippine Islands as a substitute for window glass. In Africa and India, the small cowries furnish a ready-made currency requiring only to be strung. They are the only currency of the natives of the Sudan in Africa, and traffic in these shells on the west coast of Africa has made fortunes for the Dutch and English traders, who exchange them for palm oil and ivory. A scallop shell worn by the pilgrims of the Middle Ages, to show they had crossed the sea to the Holy Land, came to be known

as pilgrim shell. These shells were frequently adopted as heraldic devices by families whose ancestors had made the pilgrimage.



UNCOMMON SHELLS

Above, at left, conch shells; right, spindle shell. Below, worm shells; at right, individual shells, and at the left, a group in an inextricable mass.

Related Subjects. For further information on the subject of shells, the reader is referred to the following articles.

Abalone Lime Button Mother-of-Pearl Mollusks Cameo Clam Mussel Conch Nautilus Cowrie Oyster Hobbies (Bibliography | Sea Scallop Shells and Sea Animals]). Snail

SHELL, a term used collectively to describe the various projectiles fired from big guns. There are many different forms of shell, varying in shape, size, and composition, according to the purposes for which they are intended. Ordinarily, a shell is a hollow steel- or coppercased projectile filled with explosive powder, or powder and bullets, which scatter when the charge is exploded by a fuse, set for this pur-

The shells used by armies on land are quite different from those used in naval warfare. On land it is seldom that the shell is required to penetrate any metal defenses, except when permanent forts are attacked, so the metal of which they are composed does not go through the hardening processes necessary for shells intended to pierce the armor plate of warships.

In World War I, the army shell chiefly used was shrapnel, except for battering down forts by sheer weight of metal. The smallest shrapnel shell is that used in field guns, which in the French, German, and British armies are guns of approximately three-inch caliber. The weight of the shell varies according as it is a

high- or a low-velocity shell. A gun will send a light shell a great distance at high velocity, and it will send a heavier one perhaps as far, but not as quickly. The French and German high-velocity shells weigh sixteen pounds. The British usually fire from the three-inch gun a shell of eighteen and one-half pounds' weight for field artillery, and thirteen pounds' weight for horse artillery. The shell contains from 250 to 363 bullets, which are discharged by the bursting of the projectile.

Siege-Gun Projectiles. For siege guns, intended to batter down forts and permanent positions, great weight of metal is needed, and as proved by the big German siege guns, shells have been brought to such perfection that no armor plate can resist their destructive effects.

The 4.7 siege gun of the United States army, called the sixty-pounder, hurls a shell of sixty pounds' weight a distance of 7,500 yards (over four miles) with great effect. The charge is 5.94 pounds of smokeless powder. The British six-inch howitzer fires a shell weighing 122 pounds, and has an effective range of 7,000 yards. By the outbreak of World War I, huge guns which operated at ranges of seven miles and more, had been completed. Two German siege guns, in a secret position in French territory, hurled shells a distance of seventy miles in attacks on Paris. The curve described by these shells reached forty miles above the earth. Naval guns of largest caliber project shells with deadly effect from distances of ten to twenty miles.

Improved methods of forging and of machining have revolutionized shell manufacture since the days of World War I. Accurate sizing of the cavity in the forging process makes boring unnecessary. A shell machine capable of turning a shell a minute is used. The United States Army has developed a supersensitive shell that can be exploded even by the force of a heavy rain. Such a shell, when it touches any part of a plane, will bring it down.

Related Subjects. The reader is referred to: Ammunition Navy Shrapnel Projectile World War I Armv Bomb

SHELLAC, shel ak'. See Lac. SHELLEY, PERCY BYSSHE (1792-1822). Though he was misunderstood and even despised by the public for which he wrote, this spokesman of the English Romantic Age has come to be numbered among the greatest of lyric poets. That special musical quality of his verse, with its delicate, ethereal beauty, that soaring imagination, that free spirit with which he was endowed, have left their indelible impress on the world. Matthew Arnold called Shelley "a beautiful and ineffectual angel, beating in the void his luminous wings in vain." That characterization is a true summary of a brief and unhappy career, but the



SHELLEY'S COTTAGE IN DEVONSHIRE

poet who could not adjust himself to his times left a body of verse that keeps his memory alive and honored.

Shelley was born at Field Place, near Horsham, Sussex, of a family that had been recently raised to a baronetcy. In his school life, from his earliest years, he displayed a hatred of oppression of all kinds, which clearly indicated the tendencies most noticeable in his He was one of the most later years. In 1810 he entered Oxford, where he soon gave ary gifts, but his pub- conventionalities of versity. was a keen disappointment to his family,



SHELLEY

ardent, independent, and reckless English poets in-spired by the French Revwhere he soon gave olution; a man who could evidence of his liter- face infamy and defy the Shelley failed to lication of a pamphlet world. Shelley failed to adjust himself to the cuson The Necessity of toms and laws of his actual Atheism caused his ex- surroundings. He was calpulsion from the uni-This event almost idolized by his intimate friends.

-Halleck.

and led to the cutting off of his allowance. For a time, then, Shelley lived in London, supported by what his sisters could save from their allowances, but at length his father relented so far as to give him the equivalent of \$1,000 a year.

Shelley's elopement with Harriet Westbrook, a pretty school friend of his sisters and daughter of a former tavern-keeper, once more turned his family against him, and he was forced to make his own way. After two years spent in traveling through England and Ireland, he became estranged from his wife, and soon afterward visited the Continent with Mary Godwin. Two years later, his wife committed suicide by drowning, and Shelley suffered keenly from remorse as well as grief. He married Mary Godwin, however, and with her and their children, went to Italy. Of the children of his first marriage, he had been deprived because of his atheism. In Italy, Shelley was associated with Byron and with Leigh Hunt, and there he produced some of his finest work. In June, 1822, he went with a friend for a sail on the Mediterranean, but the boat was overtaken by a storm, and both Shelley and his companion were drowned. The bodies were recovered and cremated, and the ashes were buried in the Protestant cemetery at Rome.

His Writings. From his early youth, Shelley had to endure persecution because of his extremely revolutionary tendencies and independence of spirit. He longed to establish an ideal state of society, based upon the principle of universal brotherhood,

and having as its object the development of individuality, rather than the upholding of institutions. Naturally, he lived in continual rebellion against existing conditions, and he sought to express himself in his verse. In Queen Mah, The Revolt of Islam, and Prometheus Unbound, his theme is the complete liberation of the world. His views, however, were not clearly defined, nor did he offer any practicable methods. The poems which most completely set forth his ideals and aspirations seem to most readers enveloped in mystery. Most obscure of all are The Witch of Allas and Epipsychidion.

His shorter lyrics, however, are so beautiful that the reader enjoys them without pondering their underlying theme. His Ode to the West Wind, The Cloud, the Ode to a Skylark, Lines to an Indian Air, and the elegy Adonais, written on the death of Keats, are typical of the best verse of the Romantic era. In Shelley's poetry personifications abound, for to him nature appeared as the symbol of his own moods and emotions. See POETRY.

B.M.W.

SHELLFISH. See CRUSTACEANS; MOL-LUSKS.

SHELL-SHOCK. See Neurosis.

SHELTER and food are man's most elementary needs. Almost all living creatures—animals, birds, even insects—provide themselves with some kind of protection from the weather and their enemies. Without the protection that shelter provides against extreme heat and cold, storms, wild animals, and human enemies, even the toughest primitive savages are helpless. Therefore from earliest times man has sought some form of protective shelter.

Prehistoric man found a weatherproof and easily protected cave for himself and his family and there made his home. With each advance in living, a change in what would be considered adequate shelter came about, and one can tell by studying the dwellings and cities of any period in history the degree and kind of civilization that existed at the time. One glance at Imperial Rome with its palaces, tenements, temples, theaters, market places, and law courts shows that the ancient metropolis was very similar to modern cities. It had wealth, poverty, religion, art, entertainment, commerce, and most of the other characteristics of a highly civilized era.

The present age is far more complex than any previous period in history, and the conception of adequate shelter has developed in a corresponding way. Modern science has revealed human needs that make the glorious palaces of the past unsatisfactory in many ways. A fairly uniform temperature is essential to physical and mental efficiency. Man cannot be healthy without good bathing facilities, toilets, and methods of sewage disposal. Sunlight and fresh air are vital to life. The palaces and castles of past ages did not take care of these needs. Rooms were lighted by a few small square openings in the walls which were covered with oiled cloth. These rooms were often dark and smelly and provided a hiding

place for germs and vermin. They were poorly heated, full of drafts, and sadly lacking in plumbing.

Modern science has also perfected the machines and processes which make it possible to satisfy the needs that have grown out of increased knowledge. Many materials unknown or extremely rare a few hundred years ago, such as glass and structural steel, are abundant and inexpensive now. Modern commerce and transportation makes possible the shipping of these

goods to all parts of the world.

Today, as in primitive times, shelter remains a fundamental need of mankind. But providing shelter presents more problems than it ever has before. The modern builder must provide hygienic shelter with an even temperature, light, fresh air, cleanliness, and also beauty—for minds and tastes must be satisfied. But man must do more than this; he must provide for all the various activities that go to make up modern life. Schools, homes, factories, stores, churches, theaters, and thousands of other buildings must be constructed so that modern society can carry on all its activities in comfort and security.

The History of Shelter. The most primitive people on record lived by hunting and fishing. Before the development of powerful weapons and the co-operative activity necessary to hunt big game, man ate berries, nuts, fruits, insects, and small animals and birds which could be run down. At this stage man lived singly or in small family groups, and moved about continuously. A very temporary shelter was constructed which showed little skill or ingenuity.



NAVAHO HOGAN

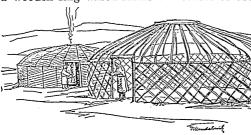
A cave, a crude pile of logs or stones covered with mud, leaves or sod, or a nest-like structure of branches and leaves placed in the crotch of a tree provided a hiding place and some protection from the weather. Shelters of this type are still used by certain Indian tribes of South America and by the African and Australian Bushmen.

The big game hunters represented a more advanced state of culture. The Indians of the Great Plains of America are typical of this level of development. Since they moved with the buffalo, they needed light and portable homes. They constructed tepees or tents by arranging three or four poles in a cone shape, and covering them with bark or animal skins. An opening

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in the top of the tepee allowed smoke to escape and an opening in the front provided an entrance. The poles were allowed to extend a considerable distance above the top of the tepee and the front was decorated with painted symbols.

The dwellings of the peoples who herded flocks represent a step between those of the hunters and those of the peoples who lived by cultivating crops and therefore remained in one place. A typical example of this level of development is the yurt of the nomadic Mongolians. The yurt is circular in shape with a diameter of twelve to twenty feet. The sides are about four feet high and are made of criss-crossed poles of wood. To the top of this frame are fastened curved poles which are fitted into a wooden ring which forms the center of the



MONGOLIAN YURT

roof and provides a smoke hole. Over this entire framework long panels of felt made from fur are fastened. The yurt is easily taken down and moved and it provides a comfortable and roomy dwelling. The tents of the Arab tribes of today represent a more modern adaptation to a nomadic existence. The interior of the tent is divided into separate compartments by hangings, and is furnished with rugs and pillows to insure comfort. The tents of the chieftains often achieve a surprising degree of luxury.

With the cultivation of crops, a more complex and interdependent type of existence came into being. The village was an expression of this co-operative relationship. It was usually composed of a number of huts inhabited by individuals or family groups. Sometimes it was made up of a group of buildings in each of which lived a number of families. Occasionally an entire community lived in one structure. A protective wall encircled the village, unless the site provided safety from enemies. Buildings were constructed for religious ceremonies and communal activities. Since produce had to be stored and commerce and barter brought valuables to the village, special buildings were erected to serve as vaults.

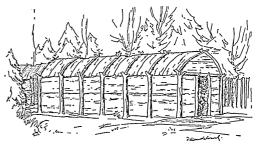
With settled family life came the need for arranging the home for cooking, sleeping, and carrying on the crafts of weaving and pottery making. The home therefore became divided into separate rooms, planned and arranged for

specific purposes. As wealth and differences of social position developed, variations in the size and comfort of homes appeared. The chieftain of a tribe often had a larger and more impressive home with specific rooms for conducting interviews and separate quarters for his servants.

Neolithic man, who developed polished stone tools, weaving, pottery, and agriculture, lived in this way. Most of the Indians of North America and Mexico, and most of the natives of Africa, the Malay Peninsula, and the Polynesian Islands were at this level of development when they were discovered by Europeans.

Native materials, climate, and living habits determined the method of construction and the size and shape of the buildings. The materials most often used in forested areas of the Temperate Zone were logs, poles, or roughly hewn boards; either left plain, plastered with mud, or covered with grass, seeds, thatch, or skins. In more arid regions where timber was scarce, stones, or bricks made from sun dried mud (adobe), were the usual materials. Very simple tools for shaping the materials were used but a high standard of craftsmanship was often attained. Four fundamental types of structures can be discerned even though innumerable minor variations of shape existed. They are (1) the rectangular structure with a pitched roof, (2) the rectangular structure with a flat roof, (3) the circular building with a domeshaped roof, and (4) the conical structure.

The Iroquois long house is a typical rectangular pitched-roof structure. The pueblos constructed by the Indians of New Mexico and Arizona represent the flat-roofed rectangular structure. And the huts of the Ba Venda tribes of Africa are excellent examples of the circular domed hut. The conical structure



IROQUOIS LONG HOUSE

erected by the primitive farmer was similar to the tepee of the plains Indian, except that it was larger and more stable and often had a roof of thatched leaves or grass.

The average long house of the Iroquois Indian was about sixty feet long by eighteen feet wide. The walls were constructed of vertical logs with forked tops. These logs were placed about five feet apart and stood about ten feet high. Horizontal braces were sometimes used near the tops of the logs. From the tops of these forked

logs long poles were extended which were lashed together at the top to make either a gabled or arched roof. This frame was then covered with bark shingles which overlapped to form a waterproof covering. The long house was built with a door at each end. The only provision for ventilation was the necessary smoke holes in the roof. A hall passage through the central section of the building led to the living and storage compartments. In this hall fire pits were built in which cooking was done. Bark partitions held erect by poles separated the various rooms. Each house cared for from twelve to twenty families and Trohatton, the largest Iroquois village, had 120 such houses.

The pueblos of southwestern United States employed a type of construction characteristic of an arid country with few trees. An easily defended mesa near a fertile valley was selected and there the Indians erected their manystoried dwellings. Rectangular stones or adobe bricks were laid with adobe mortar to form very thick walls about eight feet high. Heavy cedar beams were laid from wall to wall and small poles were laid closely together on top of the



PUEBLO VILLAGE

beams. A layer of bark was placed over the poles and the bark was then coated with a three or four inch layer of adobe. This formed the ceiling of the lower compartment and the floor of the upper story. Each story was set back from the one below it, producing a terraced effect. Ladders made from light poles led from one story to another. The rooms were rectangular and had no windows. Cooking was done out-of-doors in circular adobe ovens. The famous Pueblo Bonito was four stories in height, had over 600 rooms in it, and in addition a number of large circular pits for storing grain and water.

A typical shelter of the tropics are the huts of the Ba Venda tribes of Africa. The huts, each of which is inhabited by a single person, are grouped within a high circular palisade. In constructing the hut a circular trench is dug in the ground in which stakes three to four inches thick and six feet high are embedded closely together. This forms the walls of the hut. In making the roof, four long poles about five inches thick are tied at one end and spread apart to make an umbrella-like shape. Thinner poles are then laced onto the main poles to pro-

vide bracing and when the skeleton form is fairly rigid it is placed upon the circular wall and thatched with bundles of grass. This roof overhangs the wall a few feet and thereby provides shade. The walls of the building are plastered inside and out with a mixture of puddled anthills, cow manure, and ashes.



BA VENDA HUTS, AFRICA

There are many interesting variations of the typical primitive shelters, such as the snow igloos of the Eskimos, the hogans of the Navaho Indians, the lake dwellings of the Neolithic Age, the underground villages of the Troglodytes of North Africa, and the homes of the Toradjas, the famous head-hunters of the Celebes.

The homes of the ancient empires and also of Medieval Europe form the transition from the simple shelter of primitive peoples to the complex living quarters of today. Two characteristic types of dwellings developed during ancient and medieval times. One is the flat roofed house built of brick or stone with the rooms arranged around an open court. This type of building was used throughout the warm Mediterranean basin and came to its fullest development in ancient Greece and Rome.



The homes of the Greeks and the Romans varied in size from one-room hovels to palatial mansions, according to the wealth and social position of the owner. The average house had walls constructed of rectangular stones or bricks, stuccoed on the outside and plastered on the interior. A door opening onto the street led to the atrium, an unroofed court with a colon-

nade around it. Opening off this court were the various rooms of the house: sleeping quarters, a kitchen, a dining room, cisterns to hold water, and storage rooms. The homes of the wealthy were often two or more stories in height and had libraries, banqueting halls, art galleries, and luxurious sleeping quarters. The walls were handsomely decorated, statues adorned the halls and gardens, and the furnishings were elaborate and impressive. Windows were small but were glazed, and simple heating and ventilating systems were employed.

While the middle and upper classes of Rome lived in comfort, the poor lived in many-storied tenements. Shops lined the narrow street and the living quarters in the upper stories were cold, dark, and vermin-infested. A rudimentary type of drainage carried off surplus storm waters but these crowded districts were very unsanitary since refuse was tossed into the

streets.

In Northern Europe the cold climate, the abundance of timber, and the need for a sharply



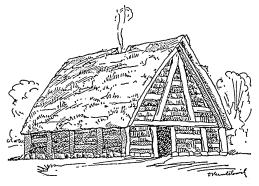
PRIMITIVE HUTS, BORNEO

pitched roof which would shed snow, resulted in a style of building typified by the English half-timbered construction.

During the Dark Ages hordes of Jutes, Saxons, and Angles entered England. Lands were seized, divided among the leaders, and each leader constructed a set of buildings called a ham (home). The entire group of buildings was surrounded by earthen walls and ditches. The ham consisted of a long wooden building called a heal (hall) surrounded by small separate buildings. The buildings were constructed of a framework of heavy wooden timbers with the spaces between the timbers filled with kneaded clay. The roof, which was high and peaked, was made of a layer of bark over the supporting timbers with a heavy layer of sod covering the The window (wind-eye) was an opening in the center of the roof which acted as a chimney or ventilator. Meals were prepared and eaten in the hall, which also provided a place of safety in times of warfare. The small separate buildings which surrounded the hall were used as sleeping quarters for the women and servants.

From this set of buildings developed the medieval fortified castle. The earthen walls

and the ditches of the earlier period became the stone wall and moat of the feudal castle. A drawbridge and heavy door protected the entrance. Inside the wall was a courtyard, a high tower, a great hall, and smaller rooms opening off the great hall. Instead of a scattering of separate buildings, the various rooms were united under one roof. Windows were small, high up in the room, and seldom glazed. After 1300 A.D., fireplaces were built into the walls, and stairways to the upper stories were constructed indoors. Since the walls of the castle might be set on fire by enemies they were



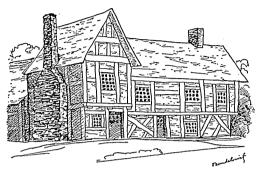
MEDIEVAL SAXON HALL

constructed of stone, but wooden beams were used to support the roofs of the high ceilings of the main hall. Rectangular openings in the protective wall and in the high tower, as well as crenellated battlements, provided lookouts and a place from which to fire on enemies.

As peace and order came to Northern Europe and trade sprang up, a middle class of traders and landed gentry came into being. Cities developed with shops, schools, hospitals, churches, and homes. In the country the fortified castles gave way to manor houses. In both city and country homes, the method of construction used in the early ham was employed. As it became perfected it developed into what is now termed half-timbered construction.

The half-timbered house was built in this way. At each corner of a brick or stone foundation a tree trunk was placed. Between these corner posts upright beams were set and horizontal beams were fastened at the top and bottom of the upright posts. Shorter horizontal beams were beveled into the uprights and diagonal braces were installed where they were needed. Some of the rectangular openings were left for doors and windows, and the remaining spaces were covered with laths. Willow branches were woven between the laths and plastered with a mixture of clay and straw. The structural beams were left exposed both outside and inside, and created a very picturesque effect. The roofs which were high and

sharply gabled were made with tie beams boarded over and thatched with straw. As wealth increased, the half-timbered houses became more elaborate and complicated. By the sixteenth century they were often three or four stories high and had bay windows and elaborate fireplaces and stairways. The upper stories often extended over the street.



SIXTEENTH CENTURY ENGLISH HALF TIMBER HOUSE

The most impressive development of the home in Europe in the sixteenth, seventeenth, and eighteenth centuries is to be found in the palaces built by the powerful monarchs and nobles. These spacious and beautiful buildings were furnished in a lavish manner. Magnificent gardens decorated with fountains and statuary surrounded the palaces. The buildings constructed by the French kings at Versailles in the eighteenth century represent the highest development of the royal palace.

The early settlers in America found an abundance of fine timber suitable for building purposes. The early New England houses were constructed almost entirely of wood. In New York, Pennsylvania, and Maryland, wood and stone were often used together. The pitched roof of Northern Europe was retained but the arrangement of the house was modified to meet the primitive conditions of pioneering and the severe winter weather. A great stone fireplace formed the nucleus of the building and when there was more than one room in a house, they were arranged around the chimney for warmth.

As the country became settled by various nationalities, a variety of styles developed. Differences in climate and available building materials, as well as the introduction of structural methods and decorative details from the various European countries, resulted in a great diversity of style in different areas of the country. For instance, in California, Arizona, and New Mexico the Spanish settlers used adobe bricks and built thick-walled, low, rambling houses which were well adapted to the warm climate. All of the houses of the early settlers in America had a simple honesty of craftsmanship that makes them much admired today.

In the nineteenth century a tendency developed to build in accordance with the historic architectural styles of the past. By the end of that century, Gothic, Renaissance, and Romanesque as well as English, French, German, and Spanish elements were apparent in the homes of America. However, these various stylistic influences were confined to the decorative details. Despite the variety of surface appearances, materials, floor plans, and methods of construction had become standardized.

The most important changes in the American home after 1850 occurred in the kitchen and the bathroom. Installed bathtubs were first introduced into America in 1842, and the first large water system in America was started in Chicago in 1855. From that time on a great variety of plumbing, heating, lighting, and cleaning equipment was invented. Machine production and the standardization of these household fixtures developed rapidly.

The standardization and machine production of building fixtures and materials was one of the elements which modified the design of modern houses. Regularity and simplicity replaced the picturesque and elaborate effects of the older handicraft methods. New materials and techniques of building encouraged lighter and more open construction. The living habits resulting from modern hygienic concepts created a desire for light and air in the home. Consequently houses were designed with an increased amount of window space and a freer access to the out-of-doors. Dust collectors such as elaborate moldings, cornices, and decorative accessories were reduced in number and size.



SEVENTEENTH CENTURY NEW ENGLAND HOUSE

Social and economic factors have been equally important in modifying the character and appearance of the modern home. The increased cost of building, the expense of household servants, and the increased tendency of women to work has resulted in living quarters with fewer rooms and more compactly designed furniture which can be easily cared for. The more informal character of modern social life has also encouraged this use of simple and unpretentious homes and furnishings. The style



which has resulted from these influences is called modern functional, and its influence can be found even in contemporary homes of

the traditional type.

Another important change in American living habits after 1900 was the tendency of city dwellers to live in apartment houses. The single family dwelling became too great a financial burden for the average citizen. The main factors responsible for the increased cost of shelter are: the prohibitive cost of land because of real estate speculation, the increased cost of labor and building materials due largely to poorly co-ordinated building techniques, the higher standard of home equipment, the high sales costs of speculative building, excessive land and property taxes, and excessive rates of interest. A study of building costs made around 1930 on houses selling for \$5,000 in California revealed the following proportional costs.

Labor costs	
Material costs25	per cent
Land costs22	per cent
Financing and selling27	per cent

Studies of more expensive homes and metropolitan area dwellings would probably show the proportional cost of land, financing, and selling to be greater. Taxes, insurance, upkeep, and deterioration costs would have to be added to make a complete picture of the costs of a home.

The same factors that make the owning of a private home difficult for the average citizen make rent excessive. The New York Commission of Housing and Regional Planning in its 1926 report found that more than 50 per cent of each dollar paid by apartment house dwellers for rent was used to pay interest on mortgages and equities. The excessive cost of home ownership and rentals has resulted in a large proportion of the population having to live in antiquated and substandard dwellings.

Modern Housing deals with the problem of the construction of dwellings which will provide the essentials of decent living, such as cross ventilation, sanitation, sunlight, quiet, a pleasant outlook, adequate privacy and space, and play space for children. Individual and group dwellings are planned as part of a neighborhood unit. Neighborhood facilities such as shops, schools, recreation opportunities, and parks are included in the total plan, which is conceived as a complete and permanent unit. Last and most important, modern housing should provide these facilities at a rent which citizens of average income or less can afford.

Since the beginning of the Industrial Revolution, cities have been subject to slum areas. With the growth of large scale industries in the eighteenth and nineteenth centuries the cities of Europe and America increased in size very rapidly. Vast areas of haphazard and jerrybuilt houses, shacks, and sheds grew up

around every industrial district with no attention paid to orderly arrangement, hygienic factors, permanence or appearance. After 1800 the specifically designed tenements came into being. Realtors designed these tenements to provide a maximum return on the financial investment. Buildings were made as tall as possible and were built solidly against one another. The greatest possible number of apartments were crowded into each building. These tenements often had windows only at the front and rear of the buildings so that rooms on the inside received no light or air except through narrow skylights. Heat, fresh water, and the disposal of sewage was inadequately provided for. An average of more than two people per room inhabited these early slums. Streets and alleys were a litter of mud, garbage, and refuse. Rats, flies, fleas, mosquitoes, and other carriers of disease abounded. One large slum area of Manchester, England, investigated in the early nineteenth century, had only one toilet to every 212 people. In Liverpool, England, at the same time, one sixth of the population lived in basements into which seeped water and sewage.

While a few humanitarians commented on the inhuman conditions of the slum areas, all early attempts to improve them were opposed by the property owners who profited from them.

The first comprehensive plan to do away with the metropolitan slum appeared in the writings of Robert Owen, an Englishman. Owen had made certain reforms in connection with his cotton mill in Scotland which he felt pointed the way to a solution of the slum problem. He advocated an uncrowded community with land enough surrounding it to insure comfort, cleanliness, and a sufficiency of foodstuffs. The dwellings were designed to facilitate family and community life, and communal schools, nurseries, and hospitals were provided. The land and buildings were to be owned by the community. Factories, mills, slaughter houses, breweries, and other industrial buildings were confined to a definite area. Owen's conception of a planned community influenced other writers, and several experimental communities were created in Europe and America. The most successful of these nineteenth century co-operative communities was Guise, France. It was organized by Charles Godin, a manufacturer of heating apparatus, and it established a pattern for housing developments in the twentieth century.

In the late nineteenth century another Englishman, Ebenezer Howard, presented a community plan in his book Garden Cities of Tomorrow which was sufficiently practical to be embodied in the city of Letchworth, England. Letchworth was founded in 1904 and two of its most interesting features are communal ownership of land and permanent retention of a

parked and gardened area. Much valuable experimentation in city planning has taken place at Letchworth.

Another attempt to improve the conditions of the working classes in the middle of the nineteenth century took the form of factory villages created by large industrialists. Saltaire, England, was one of the first of these model towns. It was started in 1852 by Sir Titus Salt, in connection with his textile mills. Within the next ten years similar developments took place in France, Denmark, and Holland. One of the most impressive of these factory towns was constructed in 1865 at Essen, Germany, by Frederick Krupp, the munitions manufacturer. New methods of laying out the city to conform to the topography of the district were evolved in planning these towns.

While a definite improvement in the quality of housing provided for workers characterized some of the factory villages, many company towns were more squalid than city slums, since only the benevolence of the owner insured good conditions. The mining towns of England, Belgium, and the United States were examples of the bad factory towns.

Except for minor improvements in the layout and planning of suburban residential tracts, and an increase in municipal zoning ordinances, there was little progress made in housing between 1900 and World War I.

The most important advance took place after World War I in England, Germany, Austria, Holland, Belgium, the Scandinavian countries, and France. The labor and social-democrat governments which came into power in those countries during the postwar epoch made remarkable progress in providing modern housing for the middle and lower income levels. The housing projects took two forms. One was the clearance of slum areas and the construction of new and modern buildings in those areas. Because of the lack of housing facilities in all European cities the need was less immediate for slum clearance than for the construction of new residential areas.

The communities vary in size from those of a few hundred homes to Becontree, London, which houses more than 100,000 people. Some of the most successful communities were those constructed in pre-Nazi Germany and in Holland. These communities were planned as complete units from the start. The topography and landscape determined the limits of the town and the placement of the various districts. Streets were laid out with main traffic arterials skirting the residential areas and connecting important centers of the community. The traditional arrangement of houses on four sides of the block was abandoned for a more open type of planning. Houses were placed to secure the maximum of sunlight in winter, spring, and fall. Permanent parked

and gardened areas alternated with groups of dwellings. Many community agencies such as recreation centers for children and adults, schools, nurseries, theaters, shops, clinics, and meeting halls provided for the needs of the dwellers. Central heating and hot water systems were designed to care for the entire community. Impressive economies in construction and upkeep resulted from the large scale of these undertakings.

Less impressive in scale but equally progressive in design were the apartment houses which were erected in many European cities for the lowest paid workers. The Karl Marx Hof in Vienna, which was wrecked by the Fascists, was the most famous of these municipal apartment houses. Individual apartments were designed to provide the maximum of comfort and cleanliness at the minimum of expense.

These postwar housing projects were financed in three ways: by means of state aid in the form of tax exemptions and subsidies; by forming co-operative societies and public utility



MODERN TRADITIONAL HOUSE

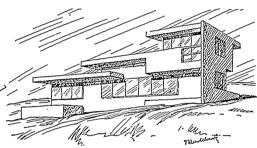
societies which provided the necessary capital; by direct municipal or state ownership. Stringent regulations made it impossible for property in these communities to become subject to financial speculation. Rents were determined purely on the basis of original cost and upkeep and in many cases government subsidies were not counted as part of the original cost.

Statistical studies show that in England and Germany rents in the new housing projects are about one third of what they are in similar apartments built by speculative realtors in New York City. The extent of these projects is impressive. Of the total number of dwellings erected in the above-mentioned countries between 1918 and 1930, approximately 70 per cent (4,587,000 dwellings) were built with official aid. Thus over 15 per cent of the entire population of these countries was living in government-subsidized housing projects in 1930.

The majority of these housing projects are built in the functional style. Ornament is eliminated and regularity, space, mass, light, color, and the natural surroundings are utilized aesthetically. A severe dignity is achieved that contrasts favorably with the elegant and picturesque effects aimed for by more conventional architects.

The modern housing movement has developed much more slowly in the United States than in Europe. Before 1932 only a few experiments in housing had been undertaken. The more notable of these experiments were the housing projects for war workers constructed by the Federal Government in Bridgeport, Conn., and Camden, N. J.; model apartment groups constructed by foundations or limited dividend societies, such as the Rosenwald and Marshall Field Houses in Chicago; and two communities planned after the garden cities of England—Sunnyside, L. I., and Radburn, N. J.

Since 1932 a number of noteworthy developments in the housing field have taken place.



MODERN FUNCTIONAL HOUSE

In 1932, Federal legislation was established under the Reconstruction Finance Corporation which permitted the loan of Federal money to limited dividend corporations for the financing of low cost housing. In the following year the National Industrial Recovery Act included a Housing Division, which in conjunction with the Public Works Administration set up an impressive slum clearance program. The Williamsburg houses, in Brooklyn, N. Y., is one of the most well-known projects constructed under the PWA program. About the same time a small number of garden cities, termed "greenbelt towns," were constructed under Federal supervision as demonstration towns. See also Housing.

In 1937 the passing of the Wagner-Steagall Housing Act established the United States Housing Authority as a permanent government body. Under the United States Housing Authority, local housing authorities initiate, build, and manage all projects and the USHA helps to finance the operation. The Federal Government will provide 90 per cent of the money necessary for a project at about 3 per cent interest, leaving only 10 per cent of the cost of the projects to be raised by the community. Many states have laws permitting

cities to grant housing project subsidies in the form of free land and tax exemption, to encourage the construction of housing projects. Within one year after the establishment of the USHA, over sixty-six commitments for housing projects costing over \$250,000,000 had been made.

This represented the Federal Government's first attempt to provide adequate shelter for the 10,000,000 families living in substandard

dwellings.

In contrast to the publicly owned housing projects, the prefabricated house is being developed to reduce the cost of the privately owned home. The standardization and mass production of building materials has already taken place. Doors, windows, building lumber, wallboard, structural steel, cabinet work, and household fixtures are manufactured in standard size. This simplifies construction and reduces cost by permitting large-scale production. The prefabricated house represents a logical extension of this tendency. Mass-production techniques are utilized in manufacturing the entire house. The basic parts of the complete house are shipped from the factory in units which can be assembled rapidly. The units are designed to allow for a variety of arrangements and thereby provision is made for differing individual needs.

As yet building costs have not been reduced substantially by prefabrication except where a great number of buildings are assembled in

one place.

Relation of Shelter to Industry. No discussion of shelter is complete without recognition of the vast amount of labor and materials

utilized by the building industry.

A recent government study of building activities in the United States between 1915 and 1937 reveals that new construction accounted for between 40 and 50 per cent of the total durable goods activity in that period. In 1928, \$10,000,000,000 was spent on the building and maintenance of dwellings. This represented over 11 per cent of the total incomes of the United States for that year and does not include the furniture and equipment.

A list of the more basic materials used in constructing the average house is impressive. Lumber, stone, brick, cement, tile, steel, iron, copper, aluminum, glass, cork, rubber, synthetic materials (such as bakelite and linoleum), paper, tar, gravel, asbestos, and paint represent only a fraction of the total number of materials used. An examination of the process of producing any one of these commodities opens up an entire vista of mining, shipping, manufacturing, importing, chemical research, and related activities. When one considers the furniture, stoves, electrical material, heating equipment, fabrics, silverware, china, pictures, plants, and similar objects that are necessary

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before the bare structure of a building becomes habitable, it is apparent that a great percentage of human activity and of the resources of the world are involved in providing society with shelter. For instance, a major part of all shipping activities is concerned with the transportation of the above-mentioned materials and objects.

The list of craftsmen involved in constructing a home is as impressive as the list of materials.

The variety of workmen and designers necessary to provide the furnishings and the various agencies employed in servicing the home, must also be remembered. A thorough consideration of the problem of shelter creates a picture of a vast activity interweaving most of the essential D.M.M. sciences, arts, and industries.

Related Subjects. The reader is referred to:

Architecture (with list) Building (with list) Castle Cave Dwellers Civilization Colonial Life in America England Eskimo Greece Heating and Ventilation Indians, American Lake Dwellings Mongolia Pioneer Life Pueblo Rome Stone Age Tenement Versailles

SHEM. See NOAH.

SHENANDOAH, PA. See PENNSYLVANIA (back of map)

SHENANDOAH NATIONAL PARK. See Parks, National; Shenandoah River.

SHENANDOAH RIVER, an historic stream of Virginia, which flows in a northeasterly direction for 170 miles through a beautiful valley formed by the Blue Ridge and the central Appalachian mountains. At Harper's Ferry it unites with the Potomac. The river furnishes a great amount of water power, but is navigable only by small steamers, and for about 100 miles. The Shenandoah Valley was an important battle area during the War between the States, when General (Stonewall) Jackson displayed some of the most brilliant strategy of the Confederate Army. Part of the valley was set aside as a national park in 1935. See Parks, National.

SHEPARD, HELEN MILLER GOULD. See

GOULD (family).

SHEPHERD DOG, the general name of a group of dogs used to guard flocks of sheep. They are usually large and strong, but the Shetland sheep dog and the Welsh corgi are small. Among the sheep herding dogs, one of the finest breeds is the Scotch collie, described in these volumes under the heading Collie. See also, Dog; Seeing Eye, The.

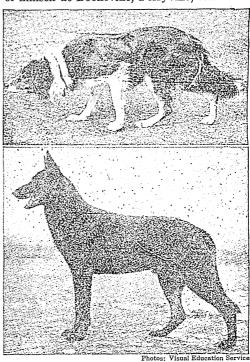
SHEPHERD KINGS. See Hyksos.

SHERATON, THOMAS. See FURNITURE

(English Furniture).

SHERIDAN, PHILIP HENRY (1831-1888), a Union officer in the War of Secession, distinguished for his high courage and brilliant qualities of leadership. His military career

was practically an unbroken series of victories and he was one of the three Union officers in that war who attained the rank of general, the others being Grant and Sherman. Sheridan was born in Albany, N. Y. He was graduated at West Point in 1853, and before the outbreak of the war between the states, learned something of actual fighting in wars with the Indians. A lieutenant at the outbreak of the war, he won rapid promotion, attaining the rank of brigadier general of volunteers in July, 1862, and of major general early in 1863. Meantime, he had given an excellent account of himself at Booneville, Perryville, and Mur-

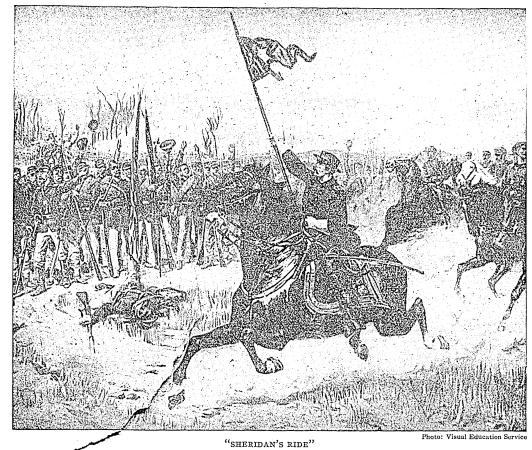


SHEPHERD DOGS

The upper picture is that of an English shepherd or border collie; below, a German shepherd. the earliest ages, the shepherd dog has been useful to mankind as an able guard of the flocks. A good herding dog can cover ground rapidly as it is said, for instance, on the Western plains of the United States, that one good shepherd dog is equivalent to three human beings in the value of the work. Sheep dogs never injure sheep, act quickly, and rapidly adjust themselves to emergencies, particularly when the flock become panic-stricken.

freesboro. In September, 1863, his division fought so gallantly at the Battle of Chattanooga that Grant, who was seeking an "active and energetic man, full of spirit and vigor and life," made him commander of cavalry in the Army of the Potomac.

Sheridan took up his new command in April, 1864, and rendered valuable service throughout the summer by protecting the flanks of



An artist's conception of the stirring episode in the War of Secession, the subject of a patriotic poem by Thomas Buchanan Read.

Grant's army and harassing his opponents. His best opportunity for brilliant service came in August, however, when he was given charge

of the Army of the Shenandoah. His defeats of Early at Opequon Creek, Fisher's Hill, and Cedar Creek, in the Shenandoah Valley, and his ruthless devastation of that fertile region must be counted among the blows against the Confederacy that hastened its fall. When the Battle of Cedar Creek was begun, Sheridan was at Winchester, twenty miles away. Hearing



Photo: Brown Bros.
GENERAL PHILIP SHERIDAN

the sounds of fighting, he galloped toward the scene of battle, and turned defeat into brilliant victory. A well-known poem by Thomas

Buchanan Read contains these lines:

With foam and with dust the black charger was gray; By the flash of his eye, and his nostrils' play, He seemed to the whole great army to say:

"I have brought you Sheridan all the way From Winchester town to save the day!"

These exploits in the Shenandoah brought Sheridan the rank of major general in the regular army, in November, 1864. During the remainder of the war, he was one of Grant's most efficient aids, and was present when Lee surrendered at Appomattox.

After the war, Sheridan commanded in turn the Department of the Gulf, the Fifth Military District in Louisiana and Texas, and the Department of the Missouri. When Sherman succeeded Grant as general, in 1869, Sheridan became lieutenant general, and on Sherman's retirement in 1884, Sheridan was appointed commanding general of the United States army. In 1870 he went to Europe to study operations in the Franco-German War. See WAR OF SECESSION.

SHERIDAN, RICHARD BRINSLEY BUTLER (1751-1816), a British dramatist whose fame rests chiefly on two comedies, *The Rivals* and

The School for Scandal. Both are classics of English drama, ranking among the best comedies produced in England since the time of Shakespeare; both have been revived and presented successfully by modern actors, for

their fun and wit seem never to grow Sheridan was born in Dublin, Ireland. Though he studied law, his fondness for writing caused him to take up literature as a means of livelihood, and in 1775 The Rivals was successfully produced in London. In the same year, his comic opera The Duenna was staged. This played for seventy-five nights,



Photo: Brown Bro

RICHARD B. SHERIDAN

a sensational "run" in those days. Soon afterward, Sheridan purchased the Drury Lane Theater, and managed it until 1809, when it burned. This disaster cut off the greater part of his income, and during the rest of his life, he was in serious financial difficulties. At one time, his friends had to raise money to obtain his release from a debtors' prison.

Sheridan was very popular among the literary men of his time, because of his wit and charming personality, and he belonged to Dr. Johnson's famous Literary Club. He also won a name as an orator during a Parliamentary career of twelve years, especially for his speeches against Warren Hastings.

Other Writings. Besides the comedies mentioned, Sheridan's principal works are a farce called Saint Patrick's Day and a comedy entitled The Critic.

SHERIDAN, Wyo. See Wyoming (back of map).

SHERIFF, sher' if, in the United States, a county officer empowered to execute civil and criminal processes throughout the county. Specifically, he is charged with the safe-keeping of prisoners and oversight of juries, and with the prevention of breaches of the peace. He attends courts as chief administrative county officer, and executes their judgments. When a warrant of attachment is issued, it is his duty to seize the property attached. If judgment is rendered against a debtor, the sheriff is the officer empowered to seize his property, and to sell it to satisfy claims of creditors. He may perform these duties in person, or through an authorized deputy sheriff. The Federal officer corresponding to a sheriff is the United States marshal.

The sheriff must be twenty-one years of age, be a citizen of the country, and reside in

the county which he represents. In most states, the office is elective. In some, the sheriff may serve but two successive terms, and in others, he is not eligible for immediate reëlection.

In Canada. Every county or judicial district in a province is represented by a sheriff, who is appointed by the provincial lieutenant governor in council. The sheriffs in Canadian provinces carry out the orders, sentences, and judgments of superior courts. They summon juries, and have charge of jails and their keepers. Each sheriff appoints his own deputies, and is responsible for their behavior as officials, and he must give security for the performance of his own duties.

Origin of the Term. The word sheriff is derived from the Anglo-Saxon word for shire reeve, the shire being a political division in old England corresponding to a modern county. The headman of the shire was called reeve.

SHERMAN, JAMES SCHOOLCRAFT (1855-1912), an American Congressman and Vice-President, born at Utica, N. Y. He was graduated at Hamilton College in 1878, was admitted to the bar in 1880, and began practice in his

native city. Not long after, he became prominent in Republican politics. In 1884 he was elected mayor of Utica, and in 1887 he became a member of Congress, serving until 1909, except for the term of 1891-1893. Sherman was elected Vice-President on the Republican ticket in 1908, and was renominated with President Taft in 1012. He died on October 30, and



Photo: Brown Bros.

JAMES S. SHERMAN

the Taft ticket was defeated at the election in November. Sherman's place on the ticket presented to the Electoral College in January was filled by Nicholas Murray Butler, president of Columbia University.

SHERMAN, John (1823-1900), an American statesman, noted for the famous silver and anti-trust laws that bear his name. He was a brother of the Union general William T. Sherman, and was born at Lancaster, O. During the war, John Sherman was as active in the financial affairs of the nation as his distinguished brother was in its military affairs. He entered the Senate as a Republican (from Ohio) in 1861, became chairman of the Finance Committee, and was a leading advocate of the bill which established the national banking system. In 1875, while still Senator, he secured the passage of the Resumption Act,

which provided for the redemption of outstanding United States notes.

In 1877 President Hayes appointed Sherman Secretary of the Treasury, and the duties of

this office he performed with high distinction. At the close of the Presidential term, Ohio again sent him to the Senate, where he remained until 1897. It was during this period that he secured the enactment of the anti-trust law and the Sherman Silver Act. President McKinley appointed him Secretary of State in 1897, but the outbreak of the war with Spain, in 1898, put too great a strain upon his



JOHN SHERMAN

failing powers, and he retired to private life.

Related Subjects. The reader is referred in these volumes to the following articles:

Banks and Banking Specie Payments

SHERMAN, ROGER (1721-1793), an American statesman of the early national period who had a prominent part in the drafting of the Declaration of Independence and of the Articles of Confederation, and in the ratification of the Federal Constitution. He was a native of Newton, Mass., but during his public

career was a citizen of Connecticut. In addition to his service in behalf of all the colonies, he had served as a member of the Connecticut legislature, as justice of the peace, judge of the court of common pleas, treasurer of Yale College, judge of the superior court of Connecticut, and as a member of the Connecticut senate. In 1784 he was elected mayor of New Haven.



ROGER SHERMAN

When the first United States Congress met, Sherman held a Connecticut seat in the House of Representatives, but the same year, 1791, he was transferred by appointment to the Senate, where he represented his state until his death.

SHERMAN, TEX. See TEXAS (back of map).

SHERMAN, WILLIAM TECUMSEH (1820-1891), one of the greatest Union generals of the War of Secession, whose name is associated particularly with the famous march "from Atlanta to the sea." It was he who uttered the famous phrase, "War is hell."

He was a brother of the statesman John Sherman, and was born at Lancaster, O., on February 8, 1820. Left fatherless in his bayhood, the youth was taken and brought up by Thomas Ewing, the first Secretary of the Interior. Sherman was graduated from West Point in 1840, near the head of the class, and entered the service with the rank of second lieutenant of artillery. For the next few years, he was stationed in the South, where he had his first experience in warfare in fighting the Seminole Indians. In his leisure moments, he studied law. During the war with Mexico, he served in California as assistant adjutant general, and in 1853 retired to civilian life and became a banker in San Francisco. Here he remained until 1857. In the interval between

1857 and the outbreak of the War of Secession, he practiced law in Leavenworth, Kan., was superintendent of a military academy in Louisiana, and president of a Saint Louis street-railway com-

pany.

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Sherman rejoined the army in May, 1861, and was soon raised to the rank of brigadier general of volunteers. In October he was placed in charge of the Departcommand by Buell in

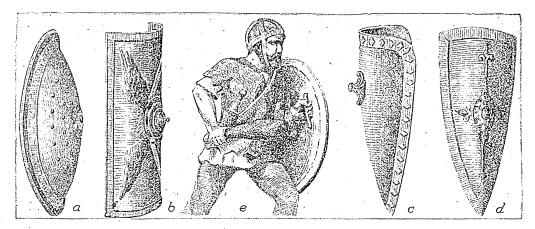


Photo: Brown Bros.

GENERAL W. T. SHERMAN ment of Kentucky, One of the commanding but was relieved of the figures of the War of Se-

November, because he reported that the campaign in the West needed an army of 200,000 men. Sherman's judgment in the matter proved to be correct. In April, 1862, he was able to give Grant substantial assistance at the Battle of Shiloh, and was raised to the rank of major general of volunteers. He continued to cooperate with Grant, and following the capture of Vicksburg, was made brigadier general in the regular army. After further valuable service in Tennessee and Mississippi, he was assigned to the chief command of the Military Division of the Mississippi.

In the spring of 1864, Sherman began his famous invasion of Georgia, with an army of 100,000 men. Atlanta was taken on September 1. Then followed the march to the sea, which ended on December 21 with the capture of Savannah. Early in 1865, he started northward, worked his way through South and North Carolina, and on April 17 received the surrender of Joseph E. Johnston's army. Lee,



SHIELDS OF ANCIENT AND MEDIEVAL DAYS

(a) Greek; (b) Roman; (c) shield of William the Conqueror (about 1066); (d) shield of the English Crusader in the Third Crusade (1189-1191); (e) method of holding the shield.

meanwhile, had surrendered to Grant, and the war was at an end.

In August, 1864, Sherman had been appointed major general in the regular army, and when, in July, 1866, Grant was made general, Congress conferred on Sherman the rank of lieutenant general. On Grant's accession to the Presidency, in 1869, Sherman became commanding general of the United States army, and he held this rank for fourteen years, when he was retired at his own request. See WAR OF SECESSION.

SHERMAN ANTI-TRUST LAW. See TRUST; HARRISON, BENJAMIN (His Administration); EDMUNDS, GEORGE FRANKLIN.

SHERMAN SILVER PURCHASE ACT. See CLEVELAND, [STEPHEN] GROVER (Second Administration).

SHERRY, a dry wine containing about fourteen per cent of alcohol, named from the town of Jerez, in Spain, around which lie the choicest vineyards of the kingdom. Here the best sherry is made. The finest grades are amontillado and manzanilla. Genuine sherry is light in color, and has a delicate flavor. Several inferior varieties are found on the market. These are fortified by being mixed with brandy and other spirits, and are usually brownish. Casks made of staves saturated in sherry are used in Scotland and Ireland for aging whisky. A wine resembling Spanish sherry is made in California. Sherry is often used in preparing delicate sauces.

SHERWOOD FOREST. See ROBIN HOOD. SHETLAND ISLANDS, the most northerly possession of Great Britain in Europe, an island group lying between the Atlantic Ocean and the North Sea. They are about fifty miles northeast of the Orkney Islands, which lie off the north coast of Scotland, and are 210 miles west of Norway. The Shetlands constitute a county of Scotland. From these islands come

the famous Shetland ponies, and they are also the home of a small breed of cattle and a breed of sheep noted for their long, fine wool. The islands number about 100, but fewer than thirty of them are inhabited, and in some cases the population is limited to the lighthouse inmates and a few shepherds. The total area is 352,319 acres, or about 556 square miles; the population is gradually decreasing, and is less than 20,000. Mainland, the largest of the group, contains the county seat, Lerwick.

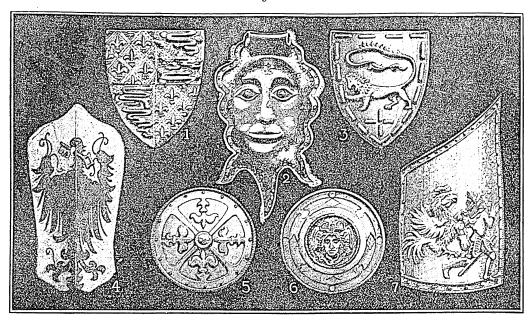
These islands possess wild and picturesque scenery, and their rugged coasts are deeply indented. During the summer season, many tourists from the mainland visit the Shetlands. The people are engaged chiefly in fishing and the raising of cattle, sheep, and ponies. The cultivation of oats, barley, and vegetables is also carried on. Hosiery and shawls are the principal articles of manufacture. There are few species of wild animals, and no snakes. On the Shetlands have been found many interesting relics of the Stone Age (which see).

SHETLAND PONY. See Horse; SHETLAND ISLANDS.

SHEYENNE, *shi en'*, RIVER. See North Dakota (Rivers and Lakes).

SHIELD, *sheeld*, a word of unknown origin, describing a piece of defensive armor borne on the left arm, or carried in the left hand, to ward off missiles and blows of a sword. In various forms and sizes, it was the principal defense in battle from the most ancient days down to the time of the introduction of firearms.

Vikings of old, when setting out in their ships, hung their shields over the sides of the boat. In the twelfth century, it was customary to carry dead knights from the battlefield on their shields. The shield of the ancient Greek infantry covered almost the entire body; that of the Romans was much lighter and smaller. In this connection, one is reminded of the ex-

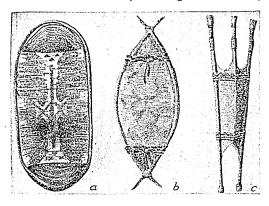


SOME FAMOUS SHIELDS

(1) Shield of the Black Prince, son of Edward III of England.
(2) Grotesque shield of Charles V of Spain.
(3) Typical shield of the Crusaders.
(4) Canvas-covered shield used in medieval Germany.
(5) Form used in many parts of Europe about the middle of the sixteenth century.
(6) Shield bearing the head of Medusa, used in the days of Charles V in Spain.
(7) The shield of Frances

hortation of the stern Spartan women to their sons—"Return home with your shield, or upon it."

In the early Middle Ages, it was the most important part of the equipment of both horse and foot soldiers. If held at arm's length, it was called a *buckler*; if swung over the arm,



SHIELDS OF PRESENT-DAY SAVAGES

(a, b) African war shields; (c) a war shield from the Philippine Islands.

with the arm across the body, it was termed a target.

It was customary in the Middle Ages to decorate the shield with many kinds of devices, the cross in various forms being much used. The device on the shield served to

identify friend and foe, which was difficult when men fought completely incased in armor.

At the present time, savage nations still carry shields to war. The shields of savage races are usually made of oxhide, and are hardened to such an extent that they resist the penetration of spears and darts.

SHIELD. See RADIO COMMUNICATION (Glossary of Radio Terms).

SHIELDS, James (1810-1879), an officer of the Union army in the War of Secession, whose statue in Statuary Hall, Washington, D. C., was a gift of the state of Illinois. Born in County Tyrone, Ireland, he came to the United States in 1826, and began the practice of law at Kaskaskia, Ill., in 1832. He served as brigadier general in the Mexican War, and was brevetted major general for gallantry. In 1848 he was appointed governor of Oregon Territory, resigning the following year, after his election as United States Senator from Illinois. In the War of Secession, Shields was commissioned brigadier general of volunteers. After resigning from the army, in 1863, he settled at Carrollton, Mo. At the time of his death, he was Senator from that state. See Statuary Hall.

SHIITES, she' ites, or SHIAHS, the lesser of the two great divisions of Mohammedans, who believe Mohammed's cousin Ali was the first true caliph, and special revelations were made to Fatima, Ali's wife. The Shiites are most numerous in Persia and India. Their

worship is a corrupt form of Islam, their zeal being rather displayed in hatred of their rival sect, the Sunnites, than in obedience to the Koran. See Mohammedanism; Caliph and CALIPHATE.

SHILKA, sheel' kah, RIVER. See AMUR RIVER.

SHILLABER, shil' a bur, Benjamin Pen-HALLOW (1814-1890), an American humorist

whose articles, written under the pen name of MRS. PARTINGTON, gained wide popularity. He was born at Portsmouth, N. H., received a commonschool education, and at an early age entered the printer's trade. Later, in Boston, he held several editorial positions with the Post, the Saturday Evening Gazette, and the Carpet Bag.



BENJAMIN SHILLABER

What He Wrote. His first book, Sayings of Mrs.

Partington, homely bits of wisdom published in 1847, was successful, and was soon followed by other works, including Rhymes With Reason and Without, Mrs. Partington's Knitting Work, and Ike and His

SHILLING, a silver coin in the English monetary system, equal to twelve pence (see Penny).

The shilling has a value of one twentieth of a pound, and since the pound is approximately equal to \$4.6884 in United States money (early 1939), one English shilling is equivalent to 23.4 cents, or practically to the 25-cent piece. According to the prewar value of the French franc, the shilling was equal to 1.24 francs. The schilling, a gold coin, was the monetary unit of Austria before its absorption by Germany. Its value was about fifteen cents. Shillings were used in the colonial days of America, but their value varied greatly (see PINE-TREE SHILLING).

SHILOH, shi' loh, BATTLE OF. See WAR OF SECESSION.

SHIMONOSEKI, she' mo no sa' ke, Treaty See Chinese-Japanese War.

SHIMOSE, shim' o seh. See Explosives. SHINANO, she' nah no, RIVER. See JAPAN (Waters).

SHINAR, shi' nahr. See Babylonia.

SHINAR, PLAIN OF, the reputed location of the Tower of Babel. See Babel, Tower of. SHINGLES. See HERPES.

SHINGLES, shing' g'lz, thin pieces of wood used to cover roofs of buildings. They usually have a uniform length of eighteen inches, with average widths of six to eight inches; some are

narrower and others are wider than these limits. Shingles are nearly three-eighths of an inch thick at one end, from which they taper uniformly to a thickness of less than an eighth of an inch at the opposite end. When laid on a roof, they must be made to overlap, one upon another, in such a manner that only five or six inches of any shingle shall be exposed to the weather. Usually, shingles are nailed directly upon the boards or roofing which covers the rafters, but tarred paper may first be laid on the rafters, as an added protection from the weather.

If a shingle averages 18 x 6 inches in size, and only 5 inches of it lies exposed to the weather, it is clear that one shingle will cover, or be exposed on, but 30 square inches of roof. To ascertain the number of shingles required to

cover a roof-

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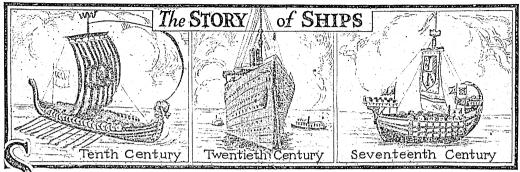
Multiply the length of one side of the roof by its breadth, in feet, and then double the product, to obtain the area of both sides, in square feet. Multiply the sum of the two sides by 144, thus finding the area in square inches. Divide this product by the number of square inches of each shingle exposed to the weather; the quotient will be the number of shingles required. Divide by 250, the number of shingles in each bunch as packed for sale, to find the number of bunches required.

Sources of Supply. Shingles are made principally from cedar, the most durable wood for the purpose, as it warps and shrinks but little on long exposure, and holds the nails well. Well-selected shingles should last from fifteen to thirty years. The great shingle mills are located near vast cedar forests; the main source of supply is in the Canadian province of British Columbia and the states of Washington, Oregon, California, Idaho, and Montana. Other sections which produce cedar shingles in smaller quantities, named in their order of importance, are Michigan, Virginia, North Carolina, Maine, Wisconsin, and Alabama.

Other Roofing Materials. While shingles are the cheapest roofing material, and meet every essential demand in most communities, slate and tiles are employed on large buildings, and on residences within prescribed limits of cities, where fireproof roofs are required. Shingles and tiles are sometimes made of short asbestos fiber, mixed with cement and pressed into shape. They are used as a protection against fire. Such shingles may be made without the tapering feature. See Roofs; CAR-

SHINTO, shin toh, was the primitive religion of Japan before the coming of Buddhism about 552 A.D. and has continued through the centuries, up to the present day. It is a form of nature worship, which centers in the Sun Goddess whose great shrine is at Isé. The Shintoists believe that the Imperial House is directly descended from this beneficent goddess. The Buddhist teaching of universal love raised Shinto to a new level. Shinto shrines, and

Buddhist temples and gardens, have filled Japan with beauty. See Japan (Religion). A.V.



By his invention of the steam locomotive and the motor car, the flying machine, and the ship, man has been able to conquer the land, the air, and the sea. Of these agencies of travel, the ship is by far the oldest. The proud ocean liner of to-day, with its equipment of a luxurious hotel, is the end of a chain that may be traced, link by link, to the sailing vessel depending on wind, such as bore Columbus to America; to the long ship of the Phoenicians, with its three banks of oars; to the birch-bark canoe of the Indian; to the raft of floating logs; and finally, to the hollowed-out tree or dug-out, used by men of the Stone Age. It is a long and romantic story-man's conquest of the sea-and it may be told here only in its broad outlines.

The Steamship. Ships driven by steam were the first, in point of time, among powerpropelled vessels. For over a century, ships of this type have been carrying passengers and freight over the "seven seas." To increase carrying capacity, steadiness, comfort, and speed has been the aim of shipbuilders everywhere, and in the effort to attain the standards set, they have increased, enormously, both the size of the ships and the power of their engines. The finest trans-Atlantic liners of to-day—the ocean greyhounds, as they are called—carry, besides cargo and crew, a floating population as numerous as that of a small town. Some of the larger ships are described briefly as follows:

The Normandie is a French line ship with a tonnage of 79,280. This magnificent liner has a length of 1,029 feet and a beam of 119 feet. The ship, with its graceful, yacht-like lines, is perfectly appointed. It has a permanent "Theatre at Sea," as well equipped as the playhouses of Paris. The swimming pool is also a distinctive feature. A mosaic freize decorates the pale blue enameled sandstone walls. There is the usual equipment for recreation, including a children's playroom. The shops are like miniature streets of Paris, and the exotic "Winter Garden" adds the last

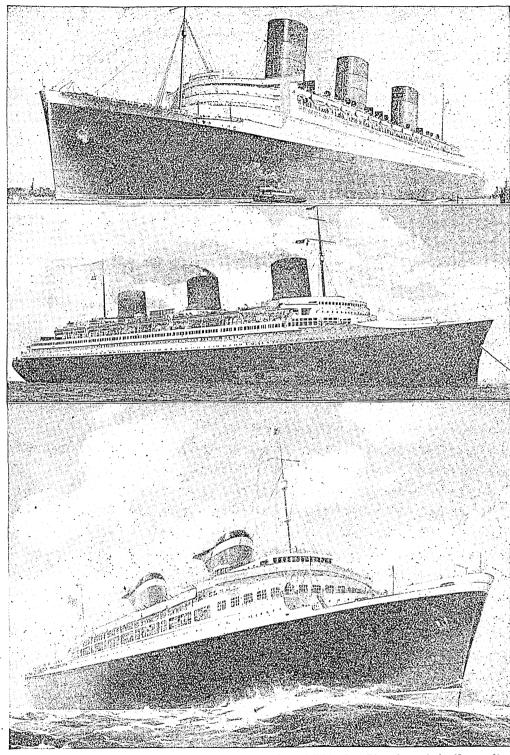
touch in luxury on board modern ships.

The Queen Mary, of the Cunard White Star Line, was the first merchant ship to be christened in person by a Queen of England. This great cabin liner was built with a length of 1,018 feet, and a width of 118 feet. The tonnage is estimated at 73,000. Stood on end, this steamer would reach to the eighty-sixth story of the Empire State building in New York City. Cushioned engines and the most modern gyrocompass are used for perfect steering and the prevention of vibration.

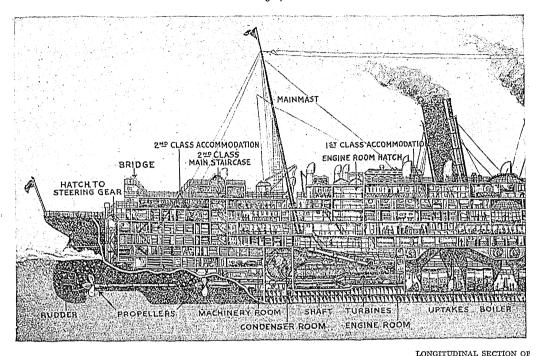
Leading among ships of the United States Lines are the sister cabin liners, the Washington and the Manhattan. They have the same measurements: tonnage, 24,289; length, 705 feet, and breadth, 86 feet. They were the first transatlantic liners to be air conditioned. The Manhattan boasts a full-size tennis court on its sun deck; a Venetian verandah cafe; a Chinoise palm court; and a Lilliputian penthouse as a part of the children's playhouse, which has a wire-enclosed section. The Washington also has all of these features. From the outside, it is impossible to distinguish the two ships. Within, the Washington has incorporated modern touches and improvements since the building of her sister ship, and employs different color schemes and fabrics.

The swift Rex and the beautiful Conte di Savoia are ships of the Italian Line. The Rex is the larger, with 51,000 tonnage, a length of 880 feet, and a beam of 102 feet. The Conte di Savoia has a tonnage of 48,500, a length of 816 feet, and a beam of 96 feet. The Rex, christened by the Queen of Italy, was furnished in eighteenth century Italian style, with original tapestries and damask, paintings, and wrought iron of the period. It has the largest Lido deck afloat. In contrast, the Conte di Savoia is modernistic, with the newest in Italian art in decoration.

The North German Lloyd is well represented by the *Bremen* and the *Europa*, each with displacement tonnage of 56,390. The *Bremen* is slightly longer, being 938 feet 8 inches as



Modern Ocean Liners. (Above) The Queen Mary of the Cunard White Star Line; (center) the Normandie of the French Line; (below) the America of the United States Lines, the largest fireproof liner in the world.



LONGITUDINAL SECTION OF

against the 936 feet of the *Europa*; each has a beam of 102 feet. These sister ships carry 3,000 passengers each. Each ship has six main kitchens, which may in turn comprise twenty smaller ones. Provisioning begins when the ship is still two days from port. The steward knows that for 1,879 passengers there must be 198.3 pounds of caviar, 183,024 slices of bread, 69,536 pats of butter, 60,438 radishes, and 46,359 eggs. One of these ships will take on board about \$12,000 worth of American food for the eastward trip, stored in provision compartments large enough to provide staterooms for 200 people, with temperatures carefully adjusted to the type of provisions in each separate room.

Previous to World War II, the following were among leading ships under various flags:

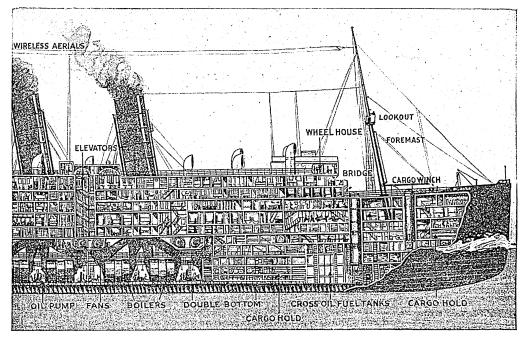
SHIP	TONNAGE	FLAG
America	34,370	American
Aquitania	45,647	British
Augustus	32,650	Italian
Bremen (see below)	56,359	German
Britannic	26,840	British
Conte Biancamano	24,416	Italian
Conte di Savoia	48,500	Italian
Europa	56,359	German
Georgic	27,000	British
Homeric	34,351	British
Ile de France	43,153	French
Manhattan	24,289	American
Mauretania	35,739	British
Nieuw Amsterdam	36,287	Dutch
Normandie	79,280	French
President Roosevelt	14,869	American
Oueen Elizabeth	45,000	British
Cuccu minapeen	-10,000	

SHIP	TONNAGE	FLAG
Oueen Mary	73,000	British
Rex	51,000	Italian
Roma	33,000	Italian
Rotterdam	24,150	Dutch
Statendam	28,201	Dutch
Washington	24,289	American

Atlantic Records Broken. The steamship speed record for the transatlantic crossing, Cherbourg to New York, formerly held by the Mauretania of the Cunard Line (5 days 2 hours 34 minutes), was broken in July, 1929, by the North German Lloyd steamship Bremen; on the return voyage, the Bremen lowered its own record to 4 days 14 hours 30 minutes. (See Knot; MILE). The Europa crossed the North Atlantic, westward, in 1933 in 4 days 16 hours 48 minutes; but the Bremen recaptured the record in 1934. It crossed in 4 days 14 hours 27 minutes.

The Rex, an Italian ship, crossed from Gibraltar to New York in August, 1933, in 4 days 13 hours 58 minutes, averaging 28.92 knots. In May, 1935, the Normandie, a French ship, made a record crossing in 4 days 11 hours and 46 minutes, averaging 29.94 knots an hour. The Queen Mary crossed the North Atlantic in August, 1936, in 3 days 23 hours 57 minutes, averaging 30.63 knots, a west-east record. In August, 1938, the Queen Mary broke the speed record for the westward crossing of the Atlantic, making it in 3 days 20 hours 42 minutes, with an average speed of 31.69 knots.

Construction. The change from sail to steam and from wood to iron and steel, in steamship construction, progressed together. The Savan-



A MODERN STEAMSHIP

nah was the first ship to steam across the Atlantic. It was laid down at New York as a sailing vessel, but was equipped with steam power and fitted with paddles. The Savannah made the crossing in 1819, covering the distance between Savannah and Liverpool in twentyfive days, and arriving just as the scientists of England had decided that such a feat was impossible. Conservative builders were likewise distrustful of iron. Iron, they argued, is heavier than water; how can an iron ship be expected to float? Experience has now shown that the steel ship is lighter than the old wooden ship, as well as more durable and stancher. In particular, the requisite strength at points subjected to tension is easier to obtain. In 1917 vessels constructed of concrete were projected, but when put on trial, were not found practical.

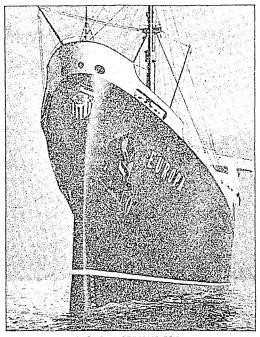
The chief points considered by a designer are stability, capacity, strength, and speed. For great speed, narrow, long lines are necessary, but they can be obtained only at a sacrifice of carrying capacity. The first consideration is, of course, safety. The stability of a ship in the water depends upon the proportion of its parts, the weight and disposition of the cargo, and the displacement. The displacement is measured by the weight of water the ship displaces, and this weight is equal to that of the ship with its cargo and passengers. Steel was introduced under modern conditions of building about 1870, and its use has tended to alter the lines of modern ships. Ships of wood had projecting keels, which increased their

stability and rendered them more manageable. The great steel liners and freighters of to-day are built without external keels. The bottom of the ship is a keel plate of steel, extending the length of the vessel, and joining the upright framework of the sides. The double-bottom system of building, developed first in the *Great Eastern* (1852), is now quite common, and it has added greatly to the safety of sea travel. The whole modern trend in construction is to simplify the various parts of the ship by redistributing the material and concentrating on the more important parts of the main structure.

The steam turbine engine, by which most large ships are driven, was evolved by C. A. Parsons, of England, in 1884. It maintains a speed of thousands of revolutions a minute, driving the twin or triple screws at racing speed. The screw was first used on ocean vessels in 1839, and has now displaced the old paddle wheels. The screw propeller is less affected by the rolling of a ship than are paddles, and it acts on a relatively greater volume of water in a given time. Most of the steamships of recent construction, and many of the older ones, are steam-electric-propelled. That is, the steam turbine does not drive the machinery directly, but serves to operate an electric dynamo, and the power thus created turns the propelling apparatus.

The use to which the ship is to be put determines the design. Passenger vessels ride high in the water, so as to afford ample light and air for the tiers of cabins. Cargo vessels, on

the other hand, ride much lower, especially when laden. These cargo ships, some being called *sea tramps*, do a great part of the world's



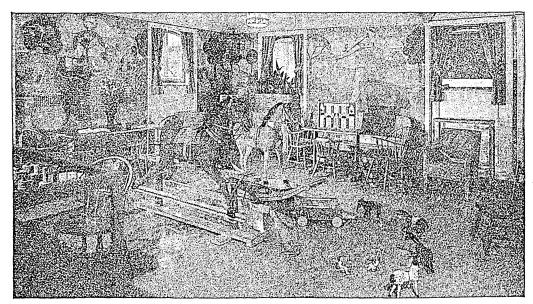
A GREAT GERMAN LINER
A striking view of the Europa of the North German Lloyd.

carrying. They maintain an average speed of from ten to eleven knots, being built for capacity rather than for speed.

The Motor Ship. Since 1909 there has been a rapid development of the motor ship, and today there are afloat over 2,000,000 tons of this type of vessel. In 1928 the output of motor ships was eighty per cent of the world's output of steam tonnage. Motor ships are equipped with the Diesel engine, an oil-burning internal-combustion device similar in structure to the gas engine, but differing from the latter in that the fuel is ignited by the heat of compression in the cylinder, instead of by an electric spark (see DIESEL ENGINE). This engine is gradually being adapted to the use of the larger boats and is proving a success on both freight and passenger ships of 30,000 tons' displacement and less. All of the important shipbuilding nations are constructing ships of this type, especially for cargo service. Because less space is needed for storing fuel, the motor ship has a proportionately larger space for cargo. Motor boats of all sizes are equipped with gasoline engines.

Sailing Ships. The sailing ship had developed many distinct types before the era of steam, the chief of which was the full-rigged ship equipped with three masts supporting square sails. Vessels of the schooner type are fore-and-aft rigged, and all sailing vessels may be divided into fore-and-aft-rigged and square-rigged, or some combination of the two. In spite of the competition of steam, there are still many sailing craft on the seas, which reach the ends of the earth with their cargoes.

Between the fifteenth century and the application of steam, the sailing ship went through a long evolution. The fifteenth-century ship



With this equipment on the Washington, every child finds something to play with. Other equipment for children includes outdoor wire-enclosed play decks.

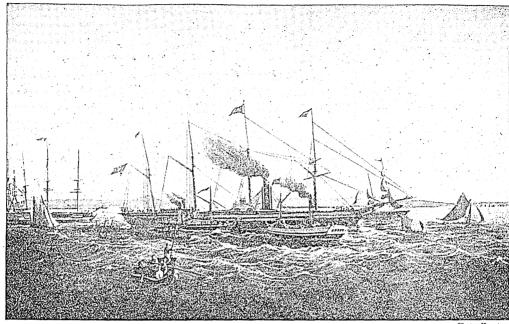
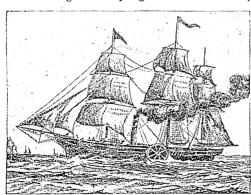


Photo: Keyston

THE FIRST ATLANTIC LINER

This vessel, the *Great Western*, was put in regular service between the United States and England in 1838. The running time for a voyage was fifteen or sixteen days. The *Great Western* was small enough so that were it still in existence it could be stored in the hold of any one of half a dozen of the great ships of the present day. Its length was 236 feet; its horse power, 450. (The horse power of the *Berengaria* is 67,000.)

was clumsy and unseaworthy, but the discovery of America gave great impetus to maritime development, and the lines of sailing craft were steadily bettered. Spain took the lead, yielding later to France and Holland, and finally to England. Such ships as the Sovereign of the Seas, the first three-decker, cost England about \$1,500,000, in the seventeenth century. It was 168 feet long and forty-eight feet in the beam,



THE SAVANNAH
The first steaming vessel to cross the Atlantic Ocean.
The feat was accomplished in 1819.

and mounted 100 guns. American ship carpenters were cunning workmen, and were among the first to avail themselves of the investiga-

tions of Scott Russell into the principles of construction. Russell announced his principles in 1832; shortly afterward, the Americans be-

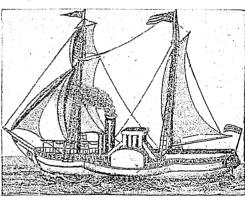
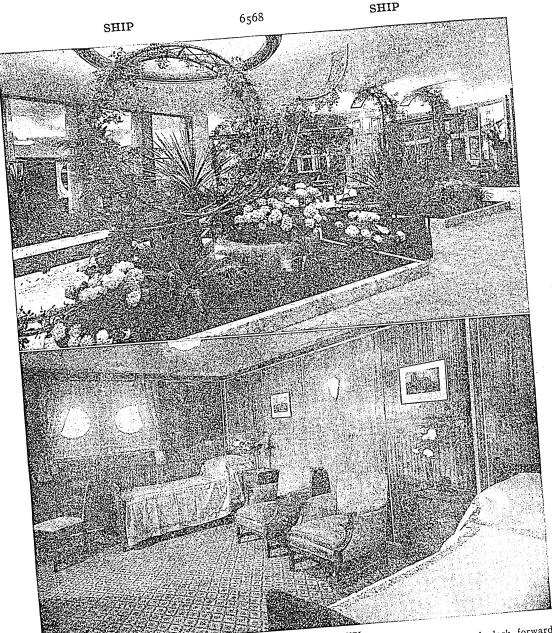


Photo: Visual Education Service

FIRST STEAMSHIP ON THE GREAT LAKES

It was named Walk-in-the-Water. There is no authentic picture of this vessel. The one shown above is from a drawing made for the bills of lading printed for the ship. [Reproduced by courtesy of the Chicago Historical Society.]

gan to lay down the fastest ships afloat. Their famous clipper ships had sharp bows and a deep stern; they were long and low in the water, and carried slender spars with a great spread of canvas. These ships carried the American flag all over the world.



(Above) the flowering "Winter Garden" of the Normandia extends full width of the promenade deck, forward, affording a cool bower of green and exotic plants; (below) a stateroom on the Washington, showing the comfort and luxury of this gracious ship.

Rotor Ships. In 1924 Anton Flettner developed a new type of ship which is called the rotor ship. It replaces sails with two rotating towers, about fifty feet in height and about ten feet in diameter, which are driven by electric motors at a speed up to 125 revolutions per minute. See Rotor Ship.

Nautical Bell. On board ship, time is

Nautical Bell. On board ship, time is marked by the striking of a bell every hour and half hour, and the term bells is used exactly as one says o'clock on land. The day

at sea is divided into six periods of four hours each, termed watches, commencing at midnight. Half an hour after midnight one bell is struck; at one o'clock it is two bells; at two, four bells; at three, six bells; at four, eight bells. Then the round commences again, eight bells being sounded every four hours. The odd number of strokes denotes the half hour.

of strokes denotes the half hour.

Some Nautical Terms. That side of the ship which is to the right of the observer who is facing the forward end, or bow, is called

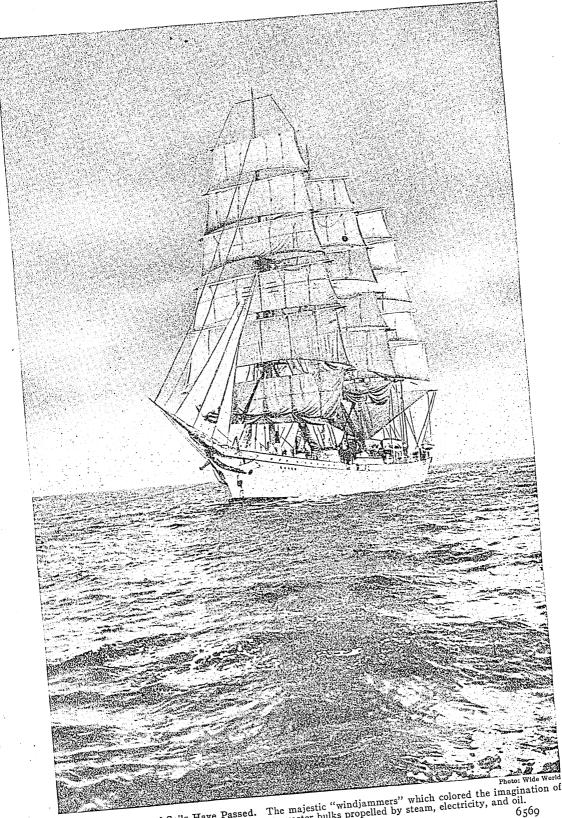


Photo: Wide World

The Romantic Days of Sails Have Passed. The majestic "windjammers" which colored the imagination of
Our forefathers have largely given way to vaster bulks propelled by steam, electricity, and oil.

6569

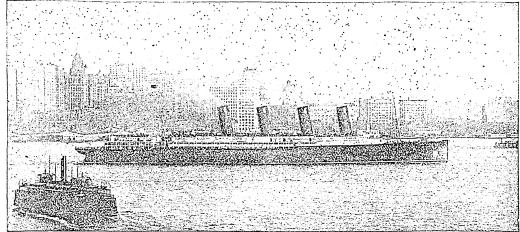


Photo: Visual Education Service

THE "LUSITANIA," VICTIM OF A TORPEDO DURING WORLD WAR I

the starboard. The opposite, or left, side is the This latter was formerly called the larboard, but that term has fallen into disuse because of the confusion resulting from two words so nearly alike. In the German and American navies, the steersman is given the orders right rudder and left rudder, instead of starboard and port. In other navies, the latter terms are employed when steering directions are given.

Signaling at Sea. See SIGNALING AND STG-NALS.

Disasters to Ships. In spite of improved construction and the use of steel, the greatest vessels that man can build are not beyond the reach of peril. Since the beginning of the present century, there have been several appalling wrecks or other disasters, in which hundreds have lost their lives. In June, 1904, the steamship General Slocum took fire in East River, New York, and 958 lives were lost. The sinking of the *Titanic* in April, 1912, with a loss of over 1,500 lives, was the worst of tragedies due to collision with icebergs. In May, 1914, the Empress of Ireland sank in the Saint Lawrence River, as the result of a collision with another ship, carrying over a thousand passengers to the bottom. When the Lusitania was torpedoed at sea, in May, 1915, 1,198 persons lost their lives. In July, 1915, the lake steamer Eastland turned over in the Chicago River and carried to death 812 excursionists. In February, 1916, the Provence II was torpedoed in the Mediterranean, with a loss of 910 lives. In November, 1928, the Vestris foundered off the coast of Virginia, III persons sinking. Near Sandy Hook in September, 1934, fire on the Morro Castle cost 124 lives.

During World War II (which see), many ships were sunk or scuttled by the nations at war.

Related Subjects. The reader is referred to:

Anchor Coast Guard Constitution, The Dock Frigate Galley Gondola Lead, Sounding Lighthouse

Mate Merchant Marine Navigation Navy (with list) Sailboat and Sailing Sounding Titanic, The Tonnage Yacht and Yachting

SHIP MONEY. See STRAFFORD, THOMAS Wentworth.

SHIP OF THE DESERT. See CAMEL. SHIPPING, LOSSES TO. See WORLD WAR I (Submarines in the War: Actual Shipping Losses).

SHIPPING SUBSIDIES. See MERCHANT MARINE, subhead.

SHIP'S LOG. See Log.

SHIRE. See Sheriff (Origin of the Term). SHIRE, she' ray, RIVER. See NYASSA. SHITEPOKE. See HERON.

SHOCK. See First Aid to the Injured. SHOCK, Electric. See Electrocution. SHODDY, a term promiscuously applied to anything which is an imitation of something of known good quality, or that which is cheap and poor in quality. This application is, however, wrong, as the term should only be applied to goods that have been rewoven. In the process of wool manufacture, there is a certain percentage of waste; a portion of the wool is "shed." The term shed has been changed into shoddy, to describe an industry of English origin, the making of fabrics from shed, or cast-off materials.

This industry has assumed important proportions in England, the United States, and Canada. There is everywhere a market for cast-off clothing and rags, which are collected and sorted into grades of wool, wool and cotton, all cotton, etc. The rags are torn apart by machinery, dusted by beating and fanning, and reduced practically to a state of unspun wool. The rags which contain both cotton and wool are treated with sulphuric acid, which destroys the cotton fibers, but leaves the wool intact. The wool thus separated is spoken of as extracted. Having been once woven and then broken up again, extracted wool is naturally in short pieces, and to make a good weave, it must be blended with some other material. For this purpose, new wool of low quality is

employed, or cotton may be used. The result is inferior to that obtained from unused wool, but a fairly satisfactory material is produced, especially if the original wool was good. Shoddy frequently wears well, and both its appearance and its quality depend on the length and texture of the fibers employed.

Shoddy is now made to appear so exactly like the original cloth that the American purchaser is practically at the mercy of the merchant, only an expert being able, usually, to distinguish between shoddy and new goods. In European countries, shoddy is sold under its proper name, with no effort at deception, and the price is accordingly low. See ADULTERA-TION OF FOODSTUFFS AND CLOTHING.

SHOEBILL. A huge, blotched yellow bill,

broad and depressed, has given the name to this singular bird, which is variously described as a heron or a stork. Travelers returning from the region of the White Nile in Africa, in the nineteenth century, brought back tales of a giant wading bird, at least five feet tall, living in the dense swamps. In 1851 the shoebill was described by zoölogists as an abnormal pelican, but eleven years later, that theory had been discredited.

Long-legged, gray, and lank, the shoebill wades grimly through the shallow water, feeding on fish and snakes. When startled, it flies into a near-by tree and watches proceedings with an angry stare. It is found only in the valley of the White Nile.

Like herons, shoebills fly with the neck curved in a letter S, while the long, black legs trail out behind; they live in large flocks, and sometimes prey on small animals. But they

do not build their nests in trees. From two to twelve chalky-white eggs are laid in a hole in dry ground, carelessly lined with leaves and grass.

In Arabian idiom, the bird is called "father of a shoe." Another familiar name, whalehead, is suggested by the broad bill—not unlike a whale's head, except for the formidable hook at the tip.

Scientific Name. The scientific name of the bird is Balaeniceps rex.

SHOEPACK. See BOOTS AND SHOES.

SHOES. See Boots and Shoes.

SHOESTRING RE-PUBLIC, a name applied to Chile (which see).

SHOGUN, sho' goon, a Japanese term for great general, or commander in chief. For several centuries previous to 1867, the shogun class, or shogunate, had exercised the real power in Japan, though nominally subject to the emperor. In 1192 the Emperor Takahira made Yoritomo, the Minamoto leader, a Seii-tai-shogun, meaning barbarian-subduing, great general. Successive generals held the title until it became hereditary in the Tokugawa family.

The revolution of 1867 restored the power

of the emperor, and the title of shogun was abolished. Foreigners sometimes applied the title tycoon to the shogun. This is merely the English rendering of the Japanese taikun, meaning great lord. The abolition of the shogun was followed by the abandonment of the old samurai military system [see Samurai; Japan (The Rule of the Shoguns)].

SHOLES, C. L. See Typewriter.

SHOOTING STAR, OR AMERICAN COW-SLIP. See Cowslip.

SHOOTING STARS. See METEORS; AIR (Weight).

SHORE BARRIER. See Arctic Lands and Seas (Ice Formation).

SHORT BALLOT, a proposal for government reform which, as its name indicates, refers to a ballot containing but few names of candidates for office. The short-ballot movement proposes that only the most important



NOBODY BUT A MOTHER COULD LOVE HIM

This grotesque African bird is the shoebill, one of the vagaries of Mother Nature.

offices shall be filled by election, and that all others shall be made appointive and dependent upon a central authority, or upon the heads of departments. In brief, the end sought is cen-

tralization of responsibility.

The short-ballot principle advocates what is almost the same as a commission form of government, under which a small number of officials are elected to fill important offices, who in turn appoint men to work under their direction in the administration and conduct of public affairs. Under such a system, the appointment of men can be made according to fitness, entirely independent of popular favor

or political influence.

It is being more and more realized that the affairs of a city or county should be conducted on strictly modern business principles, and the short ballot offers decided advantages for facilitating the appointment of men calculated to give good service to the community. With a ballot containing column after column of candidates' names, the average voter concerns himself with only a few of the most prominent. There are likely to be many candidates of whom he knows little. With a ballot limited to five or even ten candidates, the average voter would be moved to investigate the fitness of those who seek to manage the affairs of the public. The result of the vote would be an intelligent expression of opinion.

The short ballot might remove all county officials from the elective list except the county supervisors, or commissioners. These directly represent the people, and to them could be entrusted the task of selecting the men fitted to conduct the public business. Electing an official to perform certain duties, and then denying him the right to appoint the men who are to assist him in performing those duties, is to handicap him from the start. In some states, there is a demand that only the governor, lieutenant governor, and judges shall be elected officials, and that all other state officers shall

be appointive.

Related Subjects. The reader who is interested in this discussion of the short ballot may consult the following articles in these volumes:

Australian Ballot Ballot City Manager

Commission Form of Government Election Electoral College

SHORTHAND, a name for systems of writing by symbols which so shorten labor that, in recording speech, the pen can keep pace with the voice. The most rapid writer of ordinary "longhand" can write legibly fewer than sixty words per minute, but the most competent writers of shorthand are able to write more than 250 words every minute, while an ordinary shorthand writer easily writes 150 words.

The art of shorthand, or stenography, gave to the world a new vocation, that of stenographer, in which scores of thousands of young men and women, principally the latter, find lucrative employment. Also, very many people learn this art for their personal con-

CONSONANTS

Name	Phonograph	So	und of	Direction written		
P		pas	s in pope	Downward		
В		ъ	" babe			
T		t	" tight	4		
α		đ	" dead	"		
Chay	1	ch	" church	••		
J		j	" judge	44		
K	<u> </u>	k	" kick	Left to right		
Gay	_	g	" gag	"		
Ray		r	" roar	Upward		
Hay	6	h	" high	"		
F		f	" fife	Downward		
٧		. 🔻	" vat			
Ith	(th	" path			
The	())	th	" thy	••		
В	()	В	" saw			
Ż)	z	" zeal	••		
Ish)	sh	" wish	4		
Zhe	<i> </i>	z	" vision	"		
$_{\mathbf{Lay}}^{\mathbf{L}}\}$	1	1	" lull	Upward		
Yay		У	" yet	Downward		
R		r	" roar	"		
Way	7	₩	" wake	"		
M		m	" maim	Left to right		
Emp }		{mp mb	" hemp { ember }			
N		n	" noun	4		
Ing		l pg	" thing	H		

PITMANIC CONSONANTS

venience, as a time-saver. In this more limited field, shorthand is a great benefit, for it is admitted that "to save time is to lengthen life."

There are four standard systems in general use which are fundamentally the same; these are the Isaac Pitman, the Benn Pitman, the Graham, and the Munson. A person who has learned one of the last three will experience slight difficulty in reading notes written in the other two systems; and if the few variations in the Isaac Pitman system are explained to him, he can read it, as well.

This is possible because Isaac Pitman was the inventor of what is declared to be a very philosophical and flexible system, and the others have appropriated his foundation principles. He was an Englishman, and in England his work has been adopted practically to the exclusion of all other systems. Isaac's brother Benn, of Cincinnati, O., adopted the same system with about a dozen slight variations, and offered it to the American public. Before he did so, however, Andrew J. Graham, of New York, took the Isaac Pitman system and expanded it to the point where it came to be recognized as the fullest, most complete, and most flexible of the various systems of shorthand. James E. Munson was the third American to build upon the foundation laid by the English Pitman. When the term "Pitmanic shorthand" is used, it refers to the systems, alike in principle and varying only in details, built by the four men named above. Other men of lesser note have also published what they term Pitmanic systems.

However, not all shorthand is Pitmanic. In a hurrying age, someone discovered that from six to eight months is a long time to spend in acquiring a knowledge of shorthand, even though results might abundantly justify it. Why could it not be possible to devise a system which, though it might lack the philosophical basis and some of the flexibility of the existing systems, could be mastered in shorter time? The question has been answered by many authors; some of these have produced excellent systems, comparing well in working features with the older ones, but many have disappointed the public.

To meet the demand for systems easier to learn, yet which should be practical, many people have labored. Some have declared that they have perfected systems that can be mastered in thirty days, or less; the statements have not been fraudulent, but the results offered have been so brief and so lacking in the possibility of expansion that the students who have mastered their details have found the doors to efficiency and to expertness closed by their very limitations.

Among the non-Pitmanic systems, the one which has been most successful and is on an enduring and popular basis is the Gregg, the invention of John Robert Gregg, formerly an English citizen. When he introduced it into America, he was living in Boston; later, he moved to Chicago, where permanent head-quarters were established. The Cross Eclectic Shorthand, another candidate for favor, was devised by J. George Cross; it met with temporary success, but was found too complicated to be widely adopted. Other systems which have bid for favor have been the Dement, the Pernin, Longley's Takigraphy, the McKee. and the Scovil. A list of many still less important might be printed, for it is known that no fewer than 1,100 works devoted to the subject of shorthand have been printed in the English language.

Ina_much as the school that teaches a system not the Gregg or one of the four leading Pitmanic systems is a most unusual exception, this review confines its descriptive paragraphs to these two leaders in the shorthand world.

Pitmanic Shorthand. The Pitmanic systems derive their characters from parts of the circumference and the radii of a circle. There are only twenty-four sounds which it is found necessary to represent, but there are twenty-six characters, for r and h have two characters

each, used at will. Light and heavy dots and dashes represent the vowels. When a person has learned these characters and the vowels ! and their positions, he can write shorthand, slowly, it is true, and clumsily, for at that point he really begins to master the true art of his subject. There are hundreds of characters formed from consonant combinations which



PITMANIC VOWELS
The upright lines are placed only to show locations of the vowel characters in first, second, and third positions.

represent words; these are not always arbitrarily fixed, for in the signs and combinations are usually suggestions of the word or words which the signs represent.

Either t or d may be added to a great many words by making their consonant signs half length, as pay, paid; this is convenient for the past tense, but it is more often employed in forming words ending in t or d. Thus act is written with the half-length sign for k, etc. Doubling the length of a consonant stroke adds the syllable thr.

What are called initial and final *hooks* are ingeniously employed. The hook is essentially a half circle attached to the beginning or to the

end of a consonant stroke.

A small circle at the beginning or at the end of a consonant stroke adds the sound of s; a circle double the size adds the sound ses. A short enclosed loop attached to a consonant adds st; a loop twice as long adds str. There are further modifications of the circle, hook, and loop which, with a single brief stroke of the pen, add frequently recurring syllables.

The flexibility of the system briefly described is largely due to the three positions in which all characters may be written, with respect to vowel sounds. In the first position, a

character is written above the line; if there are characters in combination, the first one is placed above the line of writing, the others falling in their natural relative positions. In the second position, characters are placed on the line; in the third, below or through the line. Another feature which provides added flexibility is that all strokes are made both light and shaded.

Gregg Shorthand. Of the non-Pitmanic shorthand systems, the Gregg has probably met with greater success than all its competitors outside the Pitmanic group. The Gregg is a radical departure from everything that had preceded it. The claim is made that

Written forward:

it can be learned in half the time a Pitmanic system requires. It is a light-line system, there being no shaded characters; two or three or five positions for writing the characters, which characterize other systems, are unknown, for all writing is on one line; vowels and consonants are joined, and follow each other in their natural order. Gregg writers are taught many contractions, but they are not obliged to learn as many word signs as are presented in the Pitmanic systems.

It has been shown that the Pitmanic characters are based on straight lines and the parts of a circle; the Gregg characters are straight lines and parts of elliptical figures. The illustration above gives the consonant representations.

The vowels are presented in groups, arranged conveniently by their sounds:

A-group			O-group				
Short	à as in cat	0	Short	ō	as in	hot	u
Medium	à " " cal.	m O	Medium	aw		audit	ų
Long	à as in cat à " " cal à " " can	ne 0	Long	ō	a 4	ode	Y
	E-group			00-	group		
Short	(i as in din	0	Short	ŭ	as in	tuck	n
Medium	è " " den	· e	Medium	о́о		took	n
Long	i as in din e " " den e " " dea	$n \circ q$	Short Medium Long	<i>60</i>		doom	?

The following are the diphthongs used:

The promoters of the Gregg system claim that a million people have adopted it for daily use. Figures are not available for any of the Pitmanic systems, except that it is stated that ninety per cent of the court reporters of the United States employ either the Graham or the Benn Pitman phonography.

A, B, C Systems. The so-called A, B, C shorthand systems are really abbreviated longhand writing. As early as 1602, a method based on the alphabet was published in England, but all of the earlier systems were faulty, and did not come into general use. In recent years, an improved simplified system of this type has been introduced into business colleges. Each syllable is represented by one or two letters; for example, confer is written cf, conference is cfc, and conferring is cfg. Certain letters stand for phrases, K meaning out of the, D meaning in the, and J meaning by which. There are those who assert that this method makes for greater ease of deciphering, and requires a shorter time to learn, than regular shorthand. It is also said to equal the regular systems in speed. See also STENOTYPE.

Historical. Shorthand was an ancient art, but was apparently almost lost to the world during more than seven centuries. In the first century B.C., Marcus Tullius Tiro, secretary to the great Cicero, invented a crude shorthand system, and called it *brief writing*. Others enlarged upon his invention, and in the fifth century, the system contained 13,000 characters. In the eighth century, for reasons unknown, the art disappeared; in the year 1500 there were found notes in the old Roman brief writing

of about the year 800.

The beginnings of modern shorthand date from 1588, when Timothy Bright prepared a list of several hundred words with abbreviations. It was not at all practical, but inspired others to similar efforts. The best production of the seventeenth century was by William Mason, who named his textbook A Pen Plucked from the Eagle's Wing. Following him were over a dozen Englishmen, who produced more or less elaborate brief-writing systems, but not any of them interested great numbers of people. Not until Isaac Pitman published his Stenographic Sound Hand in 1837 and his System of Phonography in 1840 did shorthand writing command the attention of the entire world. In his David Copperfield, Dickens gives a humorous account of the difficulties which his hero overcomes in learning ·the new art.

SHORTHORNS. See CATTLE; DAIRY HUS-

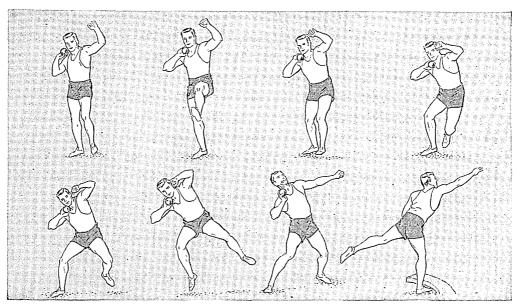
BANDRY (Dairy Farming).

SHORT SESSION. See Congress (Sessions of Congress).

SHORT-SIGHTEDNESS. See Eye. SHORT STORY. See FICTION (Short

Story). SHORT TON. See Ton.

SHOSHONEAN, sho sho' ne an, INDIANS. See Indians, American (Families or Con-



VARIOUS POSITIONS ASSUMED IN PUTTING THE SHOT

federacies; Most Important Tribes: Shoshoni). SHOSHONE, sho sho' ne, CAVERN. See MONUMENTS, NATIONAL.

SHOSHONE DAM. See Wyoming; Irrigation.

SHOSHONE FALLS. See Idaho (Rivers); SNAKE RIVER.

SHOT, a term formerly used to describe the solid projectiles fired from cannon, but not considered in that sense since the introduction of modern shell. The term is now applied only to the smaller projectiles used in sporting weapons called shotguns (which see). for sporting purposes vary considerably in size, according to the purpose for which intended. For ordinary hunting, when the game may be partridges, snipe, woodcock, or other birds, one ounce or one and one-eighth ounces of small shot are loaded in each cartridge. For larger game, larger shot are used. Shot of the sporting type may be made by pouring melted lead through the holes of a colander placed at a considerable height above water, the drops of lead naturally assuming globular form and solidifying when coming in contact with the water. The different shot are numbered according to size. See Shot Tower.

SHOT, PUTTING THE, one of the contests in a track and field meet. When the national games were played in ancient days, or when Douglas, in *The Lady of the Lake*—

... sent the fragment through the sky, A rood beyond the farthest mark,

a heavy stone was the test of strength. Now an iron ball is used; one weighing sixteen pounds is prescribed for senior athletes, and one of twelve pounds for boys. Beginners may use eight-pound balls.

Success in shot-putting depends upon ability to get the whole force of the body behind the Throwing, in which the arm does more work than the body, is prohibited. The put is made from within a circle seven feet in diameter, which is usually bounded at the front by a wooden cleat (see illustration). Standing at the back of this circle, the shotputter balances the shot in his hand, with the weight carried between the palm and the central fingers, the hand resting on the shoulder, and the elbow close to the body. If he is right-handed, he stands with the left foot ahead, then hops forward to a position in which this foot is near the cleat, immediately jumping around so that the positions of his two feet are reversed, and his weight is well forward on the right foot. It is this last jump which gives force to the shot, and the arm is not thrust out till after it. The shot should be sent into the air at an angle of forty-five de-

SHOTE, or SHOAT, a weaned pig. See Hog. SHOTGUN, a gun with a smooth bore, generally used for shooting small game. Until recently, shotguns were made with one and two barrels and occasionally with three, and the two latter yet find favor, but the single-barreled magazine gun, or "pump gun," is steadily increasing in popularity. The standard shotguns are called 10-, 12-, and 16-bore, the 12-bore being the most generally used. The standard of measurement for the bore of a shotgun is the weight of bullet required to fit it. If a bullet weighing one-twelfth of a pound

fits the bore, it is called a 12-bore gun; if one tenth of a pound is the weight of the bullet, the bore is 10, and so on. The most improved shotguns are breech-loaders, the cartridges, or shells, being inserted at the breech. The cartridge contains an explosive charge and a load of lead pellets called shot, varying in size according to the game to be hunted. From three to five cartridges can be placed in a magazine gun.

The first breech-loaders (smooth bores using round ball) date back to the Match-lock Arquebus in 1537. In 1831 Augustus Demondion patented a breech-loader and cartridge for it. In 1836 a Paris gunsmith, Lefaucheux, developed a practical breech-loading system. This was followed by a cartridge case, copper cap with anvil. In 1847, another Paris gunsmith patented the pin-fire, really the first successful shell for breech-loaders. Guns of highest quality have damascened or laminated steel barrels. Damascene barrels are built up of twisted bars of steel; laminated barrels are solid rods, bored to the required size. Shotguns which are fired by mechanism concealed in the breech are called hammerless, and are usually preferred to those with visible hammers, which sometimes rise above and interfere with the line of sight.

The effective range of a 12-bore shotgun loaded with one and one-eighth ounces of shot is usually not more than fifty-five and seventy yards, the best range for small game being forty to fifty yards. In two-barreled guns, the left barrel is generally "choked," that is, made slightly smaller at the muzzle than at the breech, for the purpose of condensing the shot. The barrels are usually twenty-eight inches long, and the gun weighs from six to seven pounds. "Sawed-off" shotguns are often used by criminals. See also Firearms.

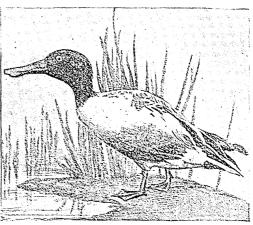
SHOT TOWER, a lofty tower for making shot (which see) by dropping melted lead in a slender stream from the top; the metal forms spherical drops in the descent and is received in a pool of water or other liquid.

SHOULDER BLADE, one of the bones of the body. See Skeleton.

SHOUP, shoop, GEORGE LAIRD (1836-1904), first governor of Idaho, and honored as its first representative in Statuary Hall, Washington, D. C. The statue was presented to the memorial hall in 1909. Shoup was born at Kittanning, Pa., and for a time was engaged in agricultural pursuits in Illinois. In the War of Secession, he was a colonel in the Union Army. He went to Idaho in 1866. When the state was admitted into the Union, in 1890, he was chosen its first governor, but resigned shortly after, having been elected United States Senator. In that capacity, he served from 1890 to 1901. See Statuary Hall.

SHOVELBOARD, shuw' 'l bohrd, a form of the word shuffleboard. See Shuffleboard.

SHOVELER, shuw' el ur, a river duck having a bill widely expanded at the end, and with the upper mandible overhanging the lower. Its plumage is a mixture of green, white, and chestnut. It feeds in shallow water, probing,



THE SHOVELER

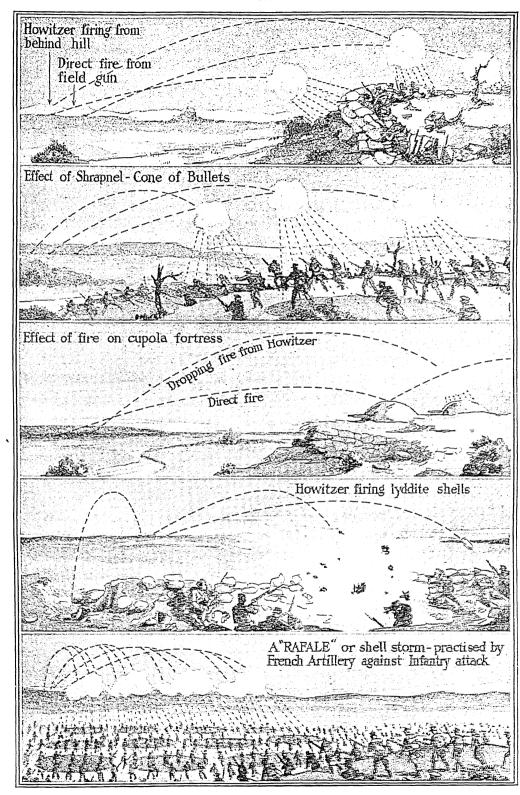
with its head immersed, for mollusks, insects, and roots, and straining out the mud and water through "gutters" in the sides of its bill. The common shoveler is found in Northern Europe, Asia, and America, migrating southward in winter. It nests on the ground, sometimes at a distance from water. The eggs number six to ten, and are pale greenish, bluish-white, or a creamy buff. See Duck.

Scientific Name. The shovelers belong to the subfamily Anatinac of the family Anatidac. The common shoveler is Spatula clypcata.

SHRAPNEL, a form of projectile used in field and naval guns. The shrapnel was invented by Lieutenant Henry Shrapnel (afterward lieutenant general) of the British army, and during World War I was recognized as one of the most reliable and effective of shells. The inventor began his investigations of hollow projectiles in 1784, and his first shell was used at Surinam in 1804. The shell contains a number of balls and a charge of powder which bursts the shell, imparting to each bullet the velocity of the shell as a whole at the moment of bursting.

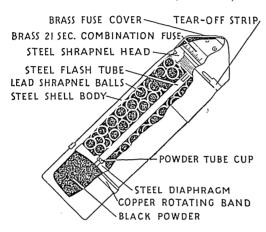
Effectiveness. Destructive effect over as large an area as possible is sought by the use of shrapnel, which on land was used mainly for clearing covered spaces, dislodging the enemy from entrenched positions, or destroying troops in open positions, by the shower of bullets forced out by the explosion of the shell. Fired at what is called effective range, which varies according to the caliber of the gun, about 300 bullets from shrapnel shell will sweep an area of from 150 to 300 yards by about 25 yards.

The fuse by which shrapnel is exploded may be set for time, for the instant of concussion,



or may be prepared to explode when even slightly grazing an obstacle. The explosion on graze is of great advantage when shielded guns are the target.

The bullets from shrapnel shell inflict a wound of quite a different character from that caused by a modern rifle bullet, which makes a clean puncture and practically sears its own wound. The shrapnel bullet has high velocity, but it has not the steadiness of the rifle bullet, which revolves on its own axis; therefore, it is



LONGITUDINAL SECTION OF SHRAPNEL This shell is about ten and one-half inches long.

liable to make a much larger and more jagged wound. The shell itself does not burst. The total weight of the shell fired bears a definite relation to the caliber of the gun.

With changing conceptions and methods of warfare, shrapnel is beginning to lose some of its importance. Modern warfare is directed primarily not against personnel (soldiers) but against property and material. This fact, together with the gradual elimination of troops concentrated in open areas lessens the effectiveness of this one-time reliable shell.

SHREVEPORT, shreev' port, La., the second largest city in the state, and the parish seat of Caddo Parish. The city is situated in the extreme northwestern portion of Louisiana, 190 miles east of Dallas and 275 miles northwest of New Orleans. Located in a district of agricultural wealth, oil, gas, and lumber, the city is the economic center of a large and prosperous area. Population, 98,167 (1940).

Shreveport occupies an area of twenty-one square miles, forming almost a half circle around the bend in the Red River. The city has over 110 miles of paved streets and boulevards, and a fine system of parks. Cross Lake, near the city, provides an abundant supply of pure drinking water. In July, 1927, two important suburbs, South Highlands and Cedar Grove, were annexed to the city.

Transportation. Shreveport is served by the Southern Pacific, the Illinois Central, the Kansas City Southern, the Louisiana & Arkansas, the Saint Louis Southwestern, and the Texas & Pacific railroads. Numerous motorbus and freight lines provide excellent service to neighboring towns. The municipal airport, served by the Delta and Chicago and Southern air lines, furnish transportation to all major cities.

Barksdale Field, one of the largest airports of the United States Army, has a landing field three miles long and one and one-half miles wide.

Industries. Lumber manufacturing and the refining of petroleum into various by-products are the city's leading industries. Other important industries include the manufacture of window and automobile glass, fertilizer, cotton-seed oil, iron products, grain and feed products, candy, and soft drinks. In the last few years, Caddo Parish has led other sections of Louisiana in cotton production, and is developing rapidly as a dairying and truck-farming section. The city is also one of the largest fertilizer-manufacturing points in the South, shipping many thousands of tons annually.

Education. Among the leading educational institutions of the city are Centenary College, under the auspices of the Methodist Board, Dodd College for Girls, Saint John's College, and Saint Vincent's Academy.

Institutions. The Shrine Hospital for crippled children, the Genevieve Orphanage, the State Charity Hospital, the Pines (a tuberculosis sanitarium), and two homes for the aged complete the principal institutions of the city. The new Court House, situated in the heart of the city, has received wide attention for its beauty of architecture. The Woman's Department Club House, on Margaret Place, is one of the outstanding buildings of the city. The Little Theater Playhouse and the Y.M.C.A. building are also noteworthy. Shreveport is the home of the Louisiana State Fair, which is held in October each year.

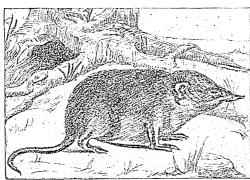
Early History. The present site of Shreveport was first occupied by the Caddo Indians.
When the Indians ceded their lands to the government, they gave a section to a white friend,
Larkin Edwards. Later Edwards sold his land
to Captain Henry Miller Shreve and six associates. Captain Shreve, who was engaged in
clearing the Red River for navigation, made
this his headquarters, and it was called Shreve
Town in his honor. Each of the seven men selected sites on which to build houses, and a
section of land was laid off into streets. In
1830 the town was granted a charter and renamed Shreveport.

C.W.L.

SHREW, shroo. Among the species that constitute the shrew family are the smallest animals known that suckle their young. These insect-eating mammals are widely distributed in both the eastern and western hemispheres, and are found chiefly in fields, woodlands, and gardens, though some live part of the time in water, and others frequent the marshes. As may be seen from the accompanying picture, shrews look very much like mice, but in habit they are more nearly related to the moles.

They have long, slender snouts that can be moved at will, and tiny eyes and ears, and their bodies and tails are covered with dark, short hair. Insects and worms form the chief part of their diet, but some species feed on young birds and other small creatures of the woods.

Several larger animals, such as weasels, foxes, and owls, prey upon the shrews, but their strong, musky odor protects them from some of their natural enemies. The smallest shrew known is found in Italy, and is but an inch and a half in length. In America there are several species, the largest, the water shrew, being six inches long. The short-tailed, or mole, shrew of Eastern United States is a flesh-eating species. Another American shrew, called shrew mouse, is found in large numbers about marshes and streams. It is much



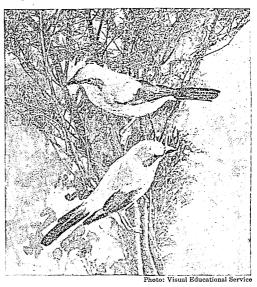
THE SHREW

lighter in color than the mole shrew. These little creatures are harmless, and they are useful in gardens, because they prey upon insects and grubs. See also TREE SHREW. L.H.

Scientific Names. Shrews belong to the family Soricidae and order Insectivora. The water shrew is Sorex palustris; the short-tailed is Blarina brevicauda; the shrew mouse, Sorex personatus.

SHRIKE. The birds that bear this name may be easily recognized by their strong, hooked beaks, and by their cruel habit of impaling grasshoppers, mice, and smaller birds upon thorns, fence barbs, or forked twigs. In . such positions, their hapless prey is torn to pieces and eaten. There are two species in North America, the northern shrike, or butcher bird, and the loggerhead shrike. The former ranges from the far north in summer to Kansas and Virginia in the winter; the latter nests in Mexico and northward to Southern Canada, and is found in the southern part of its range in winter. Both species have plumage of gray, black, and white. Their nests are built of small sticks and grasses in low trees or bushes. Both adult and young shrikes are often seen in summer on bushes, wires, and fences along country roads. The four to eight eggs are a

dull- or creamy-white color, thickly marked with cinnamon and lavender. The northern shrike is about ten inches long; the loggerhead, about an inch smaller. It is said their name originated as an imitation of their harsh

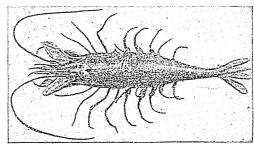


LOGGERHEAD SHRIKE

screeches or shrieks. Their love call, however, is a sweet warble. Aside from their habit of killing birds, shrikes are beneficial.

Scientific Names. Shrikes belong to the family Laniidae. The northern is Lanius borealis; the loggerhead, L. ludovicianus.

SHRIMP, a long-tailed crustacean closely related to the crawfish (which see), but found in salt waters. The common shrimp of the North Atlantic is two or three inches long. It has a humped, transparent, greenish-gray body, a pair of long feelers, pincers for seizing its prey, and small paddle-like limbs for



A SHRIMP

swimming. Shrimps like to frequent shallow waters with sandy bottom, and when in danger, they hide in the sand. Their flesh is greatly prized for its delicate flavor. Large numbers are caught in traps or nets, and sold fresh, cooked, or canned. The chief fishing

grounds are the shores of the North Atlantic in Europe and America, Louisiana coast waters, and San Francisco Bay. The larger shrimplike crustaceans are called *prawns* in England.

Scientific Name. Shrimps belong to the family Carididae. The common shrimp of the North Atlantic is Crangon vulgaris.

SHRINE. See MASONRY.

SHROVE TUESDAY, in the Roman Catholic Church, is celebrated the day before Ash Wednesday, which is the beginning of the Lenten season. It was so called from the old custom of confessing or receiving shrift on that day, but at the present time, in most Catholic countries and communities, it is a great festival of rejoicing, preceding the penitential season. It is the Carnival of the Italians, the Mardi Gras of the French, and the Pancake Tuesday of the English. In the city of New Orleans (which see), it has been celebrated since 1827 by a wonderful street pageant, brilliant masque balls, and other festivities. See Mardi Gras.

SHRUB, the name applied to a class of plants with woody stems that are self-supporting. They differ from herbaceous plants in having woody tissue, and from vines in growing erect. The latter are creeping or climbing plants, and may have either woody or herbaceous stems. Shrubs differ from trees in being of smaller height; shrubs, too, often have several stems of equal importance, while trees ordinarily have one self-supporting trunk. These are not hard and fast distinctions, as there are many gradations between the groups.

B.M.D.

Related Subjects. The plants more or less definitely classed as shrubs that have descriptions in these volumes are listed below:

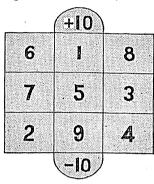
Azalea Kalmia Lilac Barberry Black Haw Magnolia Bramble Mistletoe Bridal Wreath Myrtle Buckthorn Oleander Calycanthus Rhododendron Candleberry Snowball Cherry Laurel Elder Spiraea Spurge Family Gardenia Gelsemium Sumac Heath Syringa Hydrangea Welwitschia Hyssop Winterberry Tasmine Witch-Hazel

SHRUBBY ALTHAEA. See HIBISCUS. SHUBENACADIE, shu ben ah ka' de, RIVER. See NOVA SCOTIA (Surface and Duringer)

SHUFFLEBOARD, OR SHOVELBOARD, shuv' 'l bohrd, a game in which wooden or iron weights are pushed along a board, table, or floor, with the hand or a staff, the object being to place the weights in certain compartments outlined on the board. It is played indoors and on decks of ocean steamers. Two or four persons may play, the sides taking position at

opposite ends of the board. In the indoor game, lines forming five-inch squares are drawn across a sand-sprinkled board which is thirty feet long. The line which is drawn about five inches from each end of the board is called the *deuce* line. The players slide the pieces in rotation, each being allowed to shove his opponent's weight off the board, or to

push his partner's piece into more advantageous position. If a piece is left projecting over the edge of the deuce line, three points are counted for the player. If it rests between the finishing line and the edge, or on the line, two points are counted. If



SHUFFLEBOARD

no piece is inside the line, the one nearest to it scores one. A side first making twenty-one points wins. The players change ends following every round.

The accompanying diagram shows the method of marking the deck when the game is played on shipboard. The players stand nine or ten paces away, and in rotation push the pieces (wooden weights) along the deck with a long staff having a curved end. No scores are counted until the end of a round.

If a piece rests in a semicircular place, ten is taken from the score; those resting on the numbered squares give the player a score corresponding to the numbers. The game is fifty points.

SHUMAR. See BABYLONIA.

SHUNT. See RADIO COMMUNICATION (Glossary of Radio Terms).

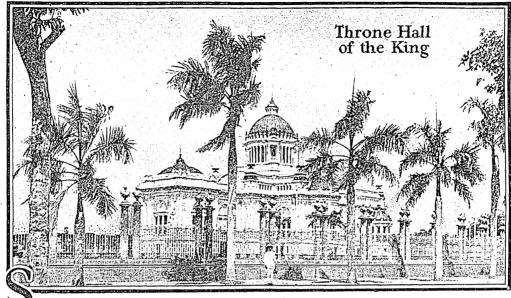
SHUNT MOTOR. See ELECTRIC MOTOR (Types of Motors).

SHUSTER, W. Morgan (1877-), American publisher and lawyer, born at Washington. After working in the War Department as stenographer, Shuster spent several years in the customs service, and from 1906 to 1909 was secretary of public instruction in the Philippines. As treasurer-general and financial adviser of Persia, from May, 1911, to January, 1912, he became widely known for his skill in handling the complicated affairs of that country. He was president of the Century Company from 1915 to 1933, in that year becoming president of D. Appleton-Century Company. See Persia (History and Government).

SHUTTLE. See WEAVING.

SHUTTLECOCK. See BATTLEDORE AND SHUTTLECOCK.

SHWANPAN, shwahn' pahn. See ABACUS.



IAM, si' am, officially Thailand, a kingdom of the Indo-Chinese peninsula (occupied by Japan in 1942), has attracted worldwide attention as a modern kingdom in the making, rather than as the medieval, romantic LAND OF THE WHITE ELEPHANT. It is called by the natives Muang Thai, or the Kingdom of the Free. Except on the south, which borders the Gulf of Siam, the greater part of the country is bordered by the English province of Burma, on the west and northwest, and by the French territory of Indo-China, on the northeast, east, and southeast. Lower Siam is that part of the Malay Peninsula extending as far as the Federated Malay States. The total area of the kingdom is 200,148 square miles, more than four times that of the state of New York.

The People. In 1937 a complete census of the population was obtained, the total number of inhabitants being 14,464,489, representing an increase of nearly 3,000,000 since the census of 1929. Many Laotian tribes live in the northern part of the kingdom, and Shan, Karen, and Kamoo tribes dwell in the uplands. Many more northern Asiatics, chiefly the Chinese, who are the business men of the nation, live in the cities.

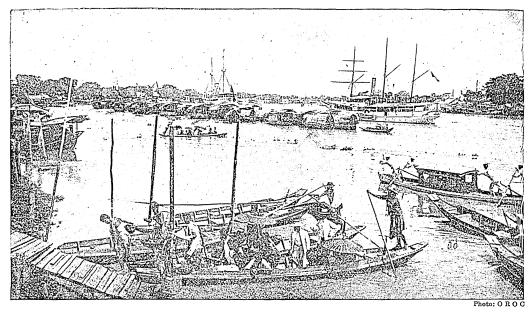
The typical Siamese is characterized by a love of independence, and is tolerant, light-hearted, and hospitable. He is of Mongolian stock, of medium height, olive complexion, fairer than the Malay. There is no distinction of caste, such as exists among the neighboring Indian peoples.

The Capital City. The chief city of importance in Siam is Bangkok, the beautiful green and gold capital, a city of islands, canals, and floating houses, sometimes called the "Venice of the East." It is situated

on both banks of the river Menam, and on islands formed by its numerous branches.

A large portion of the population live in floating houses moored in the river, and many houses are built high upon poles or on piles, to escape the floods due to the extremely low surface of the land. In its modern section, Bangkok is a beautiful, clean city, with spacious parks, efficient drainage and lighting systems, an electric railway, and all modern conveniences. The construction and extension of railways has made rapid progress since 1922. 1926 a new line was extended to the Cambodian frontier, and a bridge to link the northern and southern lines across the Menam River in Bangkok was also opened in 1926. Bangkok has an extensive commerce-about eighty-five per cent of the foreign trade of Siam—and nearly the whole of its business is carried on by Chinese. The exports consist chiefly of rice, sugar, silk, cotton, tobacco, pepper, sesame, ivory, hides, and teak. Most of the country's imports and exports move through this port. Population, about 700,000 (1929).

The Siamese are very orthodox Religion. Buddhists, and their country has been called by a foreign writer the Land of the Yellow Robe, referring to the gown worn by the Buddhist priests, of whom there are more than Since India and Burma have been ruled by Great Britain, the king of Siam has been recognized as the protector of the Buddhist faith. The natives observe many customs and ceremonies, and their regard for the white elephant has played a special part in their history. The national flag used to bear a white elephant upon a scarlet ground. These animals are valued as rarities; they are provided for by the king, and their possession is considered auspicious to his reign. There are many legends concerning the white elephant, among them being the story that one of the seven gifts to the infant Buddha was—



IN THE COLORFUL HARBOR OF BANGKOK

"a snow-white elephant, The Haste-Katna, born to bear his king."

The temples, which number over 16,100, are noted for their beauty and rich decoration, and each bears the image of the elephant.

Besides the Buddhists, there are many followers of Mohammed and Confucius; there are few Christians.

Education. Much of the education is in the hands of Buddhist priests. All of the royal



LOCATION MAP

The small black area in Southeastern Asia makes clear the relative sizes of Siam and the other Asiatic countries. For maps of Siam, see Asia (map).

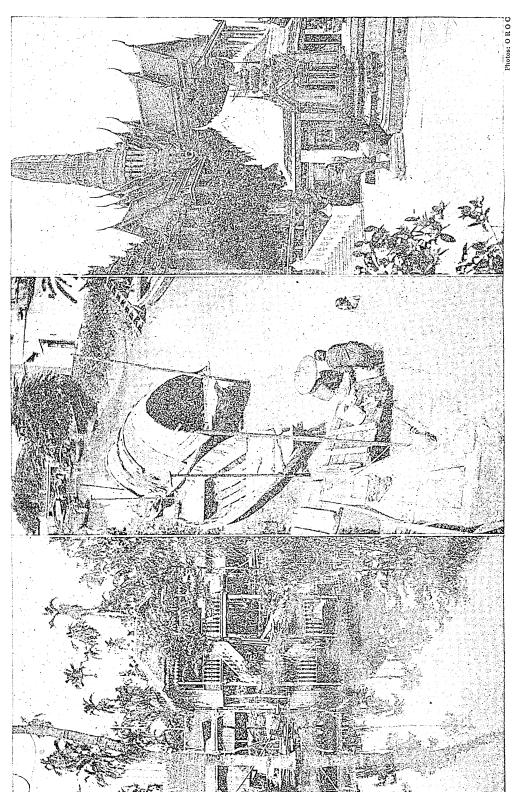
monasteries, government schools, hospitals, and a Pasteur Institute are in charge of the Minister of Public Instruction. There are about 12,800 schools, classified as government,

special, local, and private. In addition, there is a university in Bangkok, established in 1917.

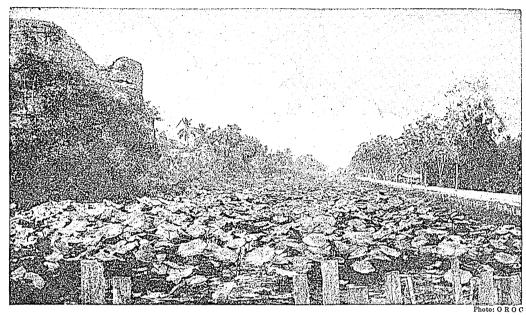
The Country and the Climate. Entrance into Siam by sea is usually made through the harbor at Bangkok, the wide mouth of the Menam River. This great waterway flows through Central Siam in a southwesterly direction, and to its annual overflow the fertility of its great valley is due, for the Menam is one of the greatest silting rivers in the world. It is in this valley, which covers some 20,000 square miles, that the largest part of the population lives. Almost as much as in Egypt, the welfare of millions depends upon flooding by the country's great rivers. The Bang Pakong, Tachin, and Mekong are important streams of the rich lands of the central section, while the great Mekong forms the eastern and northeastern frontier, and the Salwin that of the northwest. This is the region of open grass and rice lands, swamps, and reed and bamboo jungles. Covered with dense forests of teakwood, the hills rise to steep mountains in the extreme north. Lower Siam is also mountainous and wooded.

Although the climate is tropical, and its great humidity is enervating for Europeans, Siam does not have the extreme heat of India. There are three seasons—the cold season, from November to January; the hot season, from February to May; and the rainy season, from June to October. In the dry season, after the hot, glittering sunlight of the day, cool nights descend with amazing suddenness, "for there is no twilight within the courts of the sun." During the wet season, the heat is made more

intolerable by the great humidity.



Scenes in the Rapidly Developing Kingdom. Stamese homes are built on stilts, because of the damp climate and as a protection from wild animals. In the central illustration, washday and bathday are combined; the scene is in one of the canals of Bangkok. At right, a temple with a gaudily colored roof, in the grounds of the king's palace; note the guardian lion.



BEAUTIFUL LOTUS PLANTS FILL AN ANCIENT MOAT

This most once served as a defense for the people of the south against invasion by clans from North Siam. The ancient wall is being broken down by the dense growth of vegetation springing from it. The Siamese people are very fond of the lotus. An old proverb of theirs declares that "the frog lives under the lotus, yet knows nothing of its beauty, while the bee comes many miles to dust in its pollen and sip the sweet nectar from it."

Industries and Resources. Over thirtyfive per cent of the area is under crops. Practically the whole population of Central Siam, outside of Bangkok, is occupied in the growing of rice, of which there are forty or fifty varieties. The method of cultivation is primitive, but effective, and Siamese unhusked rice ranks with the best in the world. It is the national food and the chief export; an average of 1,850,000 tons is sent out yearly. fruits are abundant, including the mango and mangosteen. Large tracts of waste lands have been reclaimed by irrigation, and pepper, tobacco, hemp, maize, coffee, spices, and cotton are grown. Next to the production of rice, the teakwood lumber trade, in Northern Siam, and cattle-raising are the most important industries, and furnish valuable exports. Teakwood exports total more than \$6,000,000 The principal article of export to the United States is stick-lac (shellac).

Siam's mineral resources are varied, but, with the exception of the mining of tin in Lower Siam, they are not extensively developed. Gold, tungsten, zinc, manganese, antimony, sapphires, rubies, other precious stones, and coal are found in some of the provinces, and are also exported. Gold and silver handwork, rice products, lumber goods, and pottery products are the only manufactured goods of Siam. Since World War I, the importation of foodstuffs has doubled. Not inclined to be industrious, the Siamese is

quite willing that the Chinese and other foreigners shall operate what trades and manufactures there are in his country. Chinese coolies supply most of the skilled and unskilled labor. The teak industry is in the hands of the British.

Transportation and Communication. Modern means of transportation are replacing the elephant, coolie, and oxcart; however, there are over 8,800 tame elephants in Siam, and all of these are laborers. The rivers are important commercial highways. There are 1,925 miles of railroad, three wireless stations, about 800 telegraph stations, and about 2,500 telephones. Mail is delivered through about 800 offices and agencies. Home and international parcel-post and money-order services have long been established. Modern highways are replacing unimproved roads.

An interesting innovation in communication facilities is the development of aviation. Many of the interior towns have landing fields, and the aerodrome just north of Bangkok is well known, especially in this day of long flights. The use of the airplane in connection with mail routes has put many obscure and remote towns in touch with the outside world. The French are coöperating in the new railroad developments, in an attempt to connect their lines with those of Siam, at the frontiers.

Government. The government is a constitutional monarchy, and the crown is usually hereditary, the king having the right to appoint

his successor. In June, 1932, a Constitution was signed by King Prajadhipok. The legislature, according to the Constitution, is composed of a Senate and a Senate Executive Committee of fifteen members. The committee controls all legislation, in that any measure suggested by the king must be approved by a member of this committee, and measures vetoed by him may become laws if passed by the entire Senate. A Cabinet responsible to the committee assists the king. Provision is made for universal suffrage when all the people become literate, but until that time the right to vote is limited. Since 1892, justice has been dispensed by organized courts, with qualified judges.

History. Much of the early history of Siam is filled with fable. No coherent account of events previous to 1350 is obtainable. That date marks the founding of the city of Ayuthia as the capital, and the accession of the first supreme Siamese king. The acquaintance of the Christian world with Siam dates from the early sixteenth century, when Portuguese traders established intercourse with the country. In the seventeenth century, commercial relations with the Dutch, English, and French were established. During this period, Siam was almost continually fighting neighboring tribes to maintain its independence, and in 1767 Ayuthia was taken by Burma. A period of anarchy followed, until a Chinaman, at the head of bands of freebooters, was successful in driving out the Burmese. He set himself up as king under the name P'hya Tak, and established Bangkok as the capital. After a brief reign, during which he subdued most of the northern provinces, his reason failed, and the military leader of the country, Chao P'hya Chakkri, took over the rule, founded the present dynasty, and built the modern city of Bangkok.

The beginning of the nineteenth century marked an era of territorial expansion, and the reëstablishment of political relations with Western nations. In 1826 Great Britain and Siam signed a treaty of commerce and friendship; the year before, a treaty had been concluded with the United States. In 1851 Prince Chao Fa Mongkut received the crown which had been denied him by a usurper twenty-six years before. He had spent the period of exile in studying arts, sciences, government, and trades, unknown to the backward Siamese, and when he took the reins of government, he was able to bring his country into closer and more direct intercourse with the outside world. It was during his rule that Siam was opened to the trade of all nations.

In 1855 Great Britain made a new treaty with Siam, which established exterritoriality and put trade relations on a safer basis. Other powers made similar arrangements: the United

States and France in 1856, Denmark and the Hanseatic towns in 1858, Portugal in 1859, Holland in 1860, Prussia in 1862, and Belgium, Italy, Norway, and Sweden in 1868. In the last quarter of the century, many important changes in the country reflected the influence of the contact with the West. Abolition of slavery was begun, efficient law courts were established, education was reorganized and



PRAJADHIPOK, KING OF SIAM FROM 1925 TO 1935

spread throughout the state, military service was reformed, and railways and irrigation systems constructed.

France began its encroachments on Siamese territory in the 1880's, though it was not until 1893 that it began an open attack. In that year, the French demanded the territory east of the Mekong River and a wide belt to the west, which was to be a neutral territory. As this cession would take from Siam about one-third of its territory, the demands were resisted, but in vain, for a blockade of Siamese ports forced a complete surrender of the territory. From 1896 to 1899, France and Great Britain marked out spheres of influence for themselves, guaranteeing to uphold the independence of Siam and to prevent the interference of a third

THE STATE OF STATE OF

power. Disagreements between the French and Siamese resulted in the loss of further territory to the French in 1899, and again in 1902. Five years later, a new treaty with France caused added cessions. Great Britain gained 15,000 square miles of Siamese territory by a treaty in 1909. In return, Great Britain modified the exterritorial rights of British citizens, and advanced \$20,000,000 for railroads.

In 1917, Siam declared war against Germany and Austria, and after this conflict treaties were negotiated which resulted in the recovery of Siam's full judicial and fiscal autonomy.

Officially, the People's party established a constitutional monarchy following the revolution in June, 1932. King Prajadhipok, however, abdicated in March, 1935, when the Assembly rejected his plans for a truly democratic government. His eleven-year-old nephew became King Ananda, under a regency. In 1939 the ancient name of Thailand was restored.

After the downfall of France in 1940, Thailand demanded the return of Thai territory in French Indo-China. Refusal resulted in fighting and the occupation of border areas by Thai forces.

In March, 1941, a Japanese-mediated peace resulted in a treaty in which France ceded about 25,000 square miles of Indo-Chinese territory to Thailand. This included all former Indo-Chinese territory west of the Mekong River in Laos, and a rich rice-producing strip along the west and north frontiers of Cambodia. In December, 1941, Japan occupied Thailand in order to use it as a base for invading the Malay peninsula. As a reward for later co-operation, Japan gave Thailand four Malayan and two Burmese states in 1943. See WORLD WAR II.

Related Subjects. The reader is referred to:

Buddhism Exterritoriality Rice
Elephant Mekong River Teak

SIBELIUS, sih ba' lih us, Jean Julius Christian (1865-), a Finnish composer, born at Tavastehus. His father was a Finnish country landowner and his mother, a Swedish gentlewoman. Although he studied in Berlin and Vienna, Sibelius' music has not been influenced by European composers, but shows a remarkable originality. He has composed symphonies, orchestral works, and songs. His tone poem Finlandia is very popular.

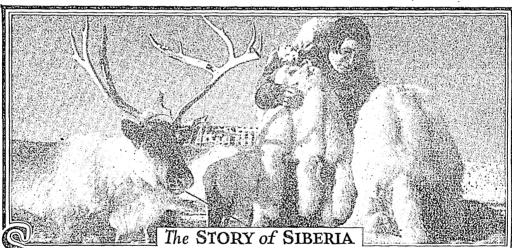


Photo: Intouriet

IBERIA, an integral part of the Russian Soviet Federated Socialist Republic, is a vast country which has been for centuries the synonym for a land of blackness and misery. To many it has seemed to be little more than Dostoievsky's "House of the Dead," the terrible prison to which unending lines of hopeless exiles marched their thousands of miles along the route where now runs the great Trans-Siberian Railway. Thus, in the days of imperial Russia, Siberia might have been likened, perhaps, to some realm which, enchanted by an ogre, was a land of darkness and horror. Instead of a dumping place for restless agitators and for criminals, it is now rapidly becoming a country of flourishing industries and ambitiously planned life.

Great agricultural tracts which needed but the impetus of modern farming, fertilizers, and machinery; mines whose buried wealth was not worked for lack of capital; water power, ready to be harnessed for the development of industry; vast forests, the source of lumber, pulpwood, and paper products, and the home of the animals whose furs are another source of riches—all these are being developed by the Soviets.

Size and Location. In the vast northern part of Asia lies Siberia, bordered on the north by the icy waters of the Arctic Ocean, and on the east by the Bering and Okhotsk seas and the mountains of the Stanovoi range. To the south are the mountains and the deserts of China and Turkestan, while on the west

Siberia meets European Russia, with which it is incorporated in the Union of Soviet Socialist Republics. Within these rather grim and forbidding boundaries is an area of nearly 5,000,000 square miles, forming a country almost twice the size of the United States.

The People and Cities. The Western, Eastern, and Far Eastern regions of Siberia have a population of about 13,000,000. They are sparsely settled, particularly in the vast Arctic section of the northeast. Siberia is chiefly rural, and the majority of the people are immigrants, or children of immigrants, principally Russians of the peasant class; some were established in colonies by the czarist government, and others went there voluntarily. Another type of settler is the convict,

thousands having been sent there during the régime of the czars. A large proportion were men and women of the upper classes, condemned for life because of political intrigue. Most of the settlements are along the rivers and railways. The remainder of



LOCATION MAP
Siberia is the largest division of
Asia. For political map, see
ASIA (map).

the population consists of native tribes.

Once transportation is extended, an immense area will be available for occupation. The agricultural area is limited, but there are mining, lumbering, and fishing districts, which will need many workers for their development.

Magnitogorsk, mahg nit oh gohrsk', is a new industrial city built by the Soviets since 1929 on the formerly barren steppes in the borderlands of Western Siberia and the Ural region. It is a part of the network of mines and mills known as the Ural-Kuznetzk region. Population, 145,900 (1939).

Omsk, awmsk, on the Trans-Siberian Railway, is the gateway between European and Asiatic Russia, and a meeting point for the trade routes between Central Russia and Turkestan. The climate, though dry and fairly mild, is marked by severe snowstorms and sandstorms. There are three universities here. Population, 281,000 (1939).

Irkutsk, ir kootsk', about forty miles from the southern end of Lake Baikal, is on the Trans-Siberian Railway. It was settled in 1686, growing out of winter quarters established about thirty years earlier for the collection of fur taxes from the native Buriats. After a fire in 1879, the city was rebuilt with wide, paved streets, and other modern features. Beautiful public buildings, a library, museum, theater, and institutional edifices make the city very attractive. There is one university. Irkutsk is an important trade center, because it is the meeting point of several caravan routes to China and the Trans-Siberian

Railway. It is also the terminus of an air line from Yakutsk. Population, 243,000 (1939).

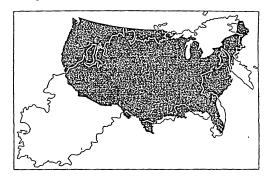
Novosibirsk, no' vo se beersk', situated on the Ob River, is on the Trans-Siberian Railway. It is the capital of the Western Siberian Region, but its recent development is due to the nearness of the Kuznetzk coal field. Population, about 278,000.

Tobolsk, toh bahlsk', is situated in Western Siberia at the junction of the Irtish and Tobol rivers. It was founded in 1587 by the Cossacks (see Cossacks). In 1917, the czar and his family were imprisoned at Tobolsk. Population, about 23,500.

Tomsk, tawmsk, a distributing center and beautiful city located on the Tom River, about 400 miles east of Omsk, is connected by a fifty-four-mile spur with the Trans-Siberian Railway. Gold discovered in the vicinity brought the city into importance about 1824, and today it is an educational center with two universities, and one of the important manufacturing cities of Siberia. Porcelain, refined sugar, flour, iron wares, and carpets are made in its factories and mills. It is the terminus of navigation by steamer from the Urals, and therefore has an extensive commerce. Population, 141,215 (1939).

Vladivostok, vlah de vahs tawk', in the Far Eastern Region is the most important Siberian port on the Pacific. The city has a safe harbor, two miles square, which is formed by the Bay of the Golden Horn. The harbor is frozen about three months of the year, but can be kept open by ice breakers. Recently, a million-dollar railway tunnel a mile long was built, to facilitate the handling of freight traffic. Vladivostok is the eastern terminus of the Trans-Siberian Railway, and has been called Russia's "window in the East." The port was particularly important during World War I, when it received millions of dollars' worth of merchandise from the United States, to be reshipped over the Trans-Siberian for use in Russia. To the north are rich iron deposits and the most accessible supply of timber for exportation. Population, 206,000 (1939).

Education. The Soviet government has a comprehensive educational system which is



COMPARATIVE AREAS
Siberia is more than one and one-half times the size of the United States.

being introduced as widely as possible. A study was made of education in other countries, and the most progressive methods of instruction were adopted. A number of technical schools and universities are located in the principal cities.

The Land. There are four distinct regions in Siberia. The northernmost one is the tundra, the frozen swamp land with its dwarf plants, mosses, and lichens. During the long winter, the few animals found here are typical northern species, such as the Arctic fox, polar bear, reindeer, and polar partridge; in the spring the birds come in large numbers, followed later by the wolves, bears, and ermine. South of the tundra is the taiga, or virgin forest, the largest zone of all and the largest pine forest in existence. It is the home of the fur-bearing animals which make Siberia the chief fur-producing country of the world. The most important are the bear, lynx, wolf, fox, sable, squirrel, and hare.

Between the taiga and the steppes, at the far south, is the continuation of the famous "black-soil" belt of European Russia. Through this zone runs the Trans-Siberian Railway, and along it lives the greater part of the population. The steppes have less fertile soil, and are used mainly for stock raising and some

agriculture.

Central Siberia is bordered on the south by the Altai and Yablonoi Mountains. Across the eastern end of the country extends the Stanovoi range, dominating a region that is varied only in the southeastern section, where

lie the broad valleys of the Amur.

Nowhere in the world is there such a vast, promising land of such varied resources. Its great spaces are now being increasingly opened up by improved transportation—water, rail, and air—and the time may be not far off when this hitherto neglected country, like Cinderella,

may outshine its elder sisters.

Rivers and Lakes. Siberia is a land of great rivers which are navigable for thousands of miles. The severe winters, and the fact that most of the rivers have their outlet in the Arctic Ocean, make navigation impossible a great part of the year. Four great river systems—the Ob, Yenisei, Lena, and Amur form a network over the whole land. Lake Baikal, with an area of 13,200 square miles, is the largest fresh-water lake in Asia.

With comparatively little outlay, it is believed that these rivers could be linked, by canals and with the aid of locks, into an all-Siberian water route which would be of tremendous value to transportation. Because of the great distances in Siberia, freight charges are almost prohibitive, and a water route would lower them very considerably. Plans for connecting some of the rivers are already

being carried out.

The obstacle of the frozen northern ports is being overcome by what is known as the Kara Sea route. With the aid of radio stations, hydroplanes, and meteorological stations, Soviet vessels as well as ships from England, Sweden, and other ports are able to brave the ice for

at least two months, August and September. Even in this short season, a greater amount of goods can be transported over this route than by rail during the year.

Almost all official and commercial communication with Siberia is now carried on by radio. The installation of the latest American radio equipment, with special wave-lengths suited to transmitting conditions in Siberia, has added greatly to the value of radio for commercial use.

Climate. Siberia is known for its long, cold winters. Not even at the North Pole does the temperature fall so low. Near the Arctic Ocean a temperature of 97.6° below zero has been recorded; in some remote northern sections, the ground is always frozen to a depth of over 300 feet (see TEMPERATURE). Throughout most of the country, a dry atmosphere renders the severe temperature somewhat more tolerable than it would otherwise be. The mean summer temperature varies from 53° to 65°, but the many hours of sunlight contribute to the rapid growth of vegetation. Excepting along the Pacific coast, the rainfall is light, but the constant thawing of the subsoil supplies vegetation with moisture. Lack of transportation and a scanty population have been more of a drawback to agriculture than the climate.

Agriculture. Siberia having been for ages an agricultural country, it is probable that many years will pass before other interests surpass the practice of farming, although the best agricultural district is but the small southwestern area of the black-soil belt. As the peasant learns modern methods of farming from the model farms run by the government, and as modern farm machinery is introduced, there should be greater returns than before. When cheap and efficient transportation is available, Siberia may become one of the great-

est grain markets of the world.

Wheat, oats, and rye are the chief crops, although potatoes, beets, peas, beans, barley, flax, and other cereals and fibers are grown. Strawberries, blackberries, raspberries, and cranberries grow in great profusion, and these may be of increasing value as the country

develops.

On the steppes, livestock raising is the important industry. There is abundant grazing land, and the soil is not as well suited to farming as in the black-soil belt. The only drawback is the need of feeding and sheltering the cattle during the severe winters. cattle, goats, reindeer, and camels are raised.

Dairying is an important industry. In 1894 Siberia began the exportation of butter, with 14,400 pounds shipped that year; in less than twenty years, this rose to 165,000,000 pounds a year. It is of special interest that this industry has always been managed by peasant coöperative societies, and was possibly the



AN EXAMPLE OF THE MODERNIZATION OF SIBERIA

A hotel on the Red Prospect in Novosibirsk, the capital of the Western Siberian Area.

forerunner of the great coöperative societies which are such a factor of Soviet Russia today.

Fisheries. This is another resource which needs better transportation and modern methods, especially in the waters of the Soviet Far East where the Japanese have fishing concessions, a source of frequent diplomatic disputes between Moscow and Tokyo. Lobsters, crabs, salmon, cod, and herring are the principal fish of commercial value.

Minerals and Mining. Siberia is rich in minerals, but owing to meager transportation and antiquated methods, the mineral industry made little progress until recently. Coal, iron, gold, silver, lead, zinc, copper, manganese, tungsten, sulphur, asbestos, petroleum, sodium, iridium, and platinum are but a few of the world's minerals to be found in the country. Large plants have been erected to take care of the vast supply of iron ore. Coal is found in most of Siberia; some of the world's largest coal basins are the Tungusk, the Kuznetzk, the Minussinsk, and the Cheremkhovsk. The iron fields of the Urals and the coal of Kuznetzk have been linked by the Soviets in a remarkable group of modern mines and giant factories known as Uralo-Kuznetzk Combinat.

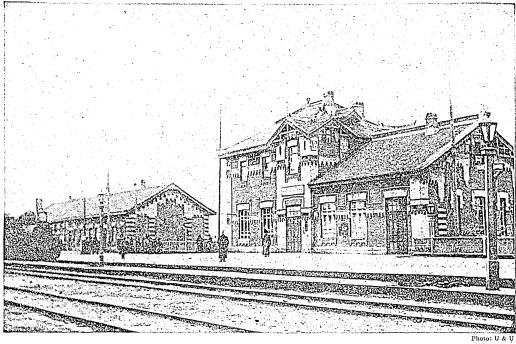
Probably the greatest potential gold area of the world is in this treasure land of the Arctic. Siberia ranks first in the gold production of the Union of Soviet Socialist Republics, and the mines along the Lena River

produce over 80 per cent of the Siberian output. The introduction of electric dredges and other modern equipment for the mining of gold has greatly increased production. To facilitate mineral transport, railways and seaports have been extensively developed. See Russia (Minerals and Mining).

Forests. The forests of Siberia cover over 900,000 square miles, and in no field is the need of proper transportation and adequate methods so vital as in the lumbering industry.

Manufactures. For many years, the largest part of Siberian manufactures has been the product of the home industries. The chief manufacturing plants have been flour mills, breweries, sugar refineries, and tanneries. With the introduction of capital for modern machinery, skilled workmen, and better transportation, manufacturing has increased rapidly, for Siberia is a storehouse of raw materials, and has the necessary water power to operate any number of industries.

Transportation. The Trans-Siberian Railway, which connects Vladivostok with Moscow and Leningrad, is the most important commercial route of the country. The opening of this railway in 1905 was a great incentive to the agricultural and manufacturing interests of the country. To it flows the traffic of all the great rivers, and numerous commercial and industrial centers have been developed along the line. It is the longest single railway



A SIBERIAN RAILROAD STATION

Under the government of the czar the Trans-Siberian Railway was built. Under the Soviet Republic additional mileage and improved equipment have added to the importance of the line. The illustration shows that the stations along the line have been well built.

line in the world, with a length of about 5,800 miles. In 1937, the Soviets were completing the double tracking of the entire route. The trip from Moscow to Vladivostok takes eleven days. A Turkestan-Siberian railway 906 miles long was opened in 1930. The rolling stock deteriorated greatly during World War I, but regular service has been re-established. As indicated in the section above (see Rivers and Lakes), the rivers may become a greater means of bridging the vast spaces of Siberia than the railways. Several passenger air lines are in operation, over thousands of miles, and plans are being formulated for the introduction of lines for merchandise. Caravan routes, over which goods are transported on the backs of camels and horses, lead from the principal Siberian cities to the leading cities of Manchuria and Mongolia.

Development of the natural fuel supplies for automobiles would facilitate transportation, for the plains of Western Siberia are passable for wagons and automobiles during the greater part of the year. Under the Soviets, oil has been found and exploited in several regions in Siberia.

Government. Siberia, a part of the former Russian Empire, is now included in the Russian Soviet Federal Socialist Republic. The entire territory, for administration, was reorganized in 1930. It now comprises two Autonomous Soviet Socialist Republics (A.S.S.R.),

Yakutsk and Buriat-Mongol, each governed by its own Presidium and Council of People's Commissars; and three large regions—the Western Siberian, Krasnoyarsk, and Far Eastern Areas. The widely separated settlements in the areas are governed by local soviets or councils, but the government of the whole area is directed by the Presidium of the Russian Soviet Federated Socialist Republic.

(For details of the Soviet system, see the article Russia [Government]).

History. Siberia began its history with the migrations of people forced into the frozen north by the Huns and Tatars. Little is known of this early period. Small principalities became the prey of Turkish tribes who made some pretense of civilization in the empire they set up. Genghis Khan included these people in his conquest of the thirteenth century, and destroyed what culture they had attained. Three hundred years later, a Tatar Khanate with a capital at Sibir sought recognition from Moscow, but failed, and Russia's first encroachments in Siberia came through the victories of a Cossack adventurer, Yermak. He led a small band of Russians and Cossacks into Siberia, defeated the Tatars, and captured Sibir, about 1579. Yermak was drowned five years later, but he had gained for Russia the beginning of a vast empire. Further invasion of Siberia was easy, and within the next half

century, the Russians had reached the Pacific. In their attempts to extend their power into the Amur region, they met with resistance from the Manchus. By a treaty negotiated in 1689, Russia relinquished its claims to Amur, and it was not until the middle of the nineteenth century that an attempt was made to regain possession of this area. In 1858 China concluded a treaty with Russia which made the Amur River the boundary between the two countries. Two years later, further territorial concessions were made by China, and Vladivostok, the most important Russian port on the Pacific, was founded.

In 1710 Peter the Great instituted the custom of sending political prisoners to Siberia, and from this practice Siberia has come to be known as a land of privations, sorrow, and dreary frozen wastes. Later, hundreds of thousands of murderers, thieves, and forgers were sent there as convicts and settlers, but they proved to be poor material for the colonization of Siberia. Many peasants emigrated there voluntarily and worked in the gold mines, and later the imperial government subsidized emigrants who were willing to help colonize Siberia, to counteract the large number of Chinese coming in from the south. The Trans-Siberian Railway had been projected many years before, as an aid to colonization. By 1900, Russia had gained a foothold in the Liaotung Peninsula, and a strong naval base was built at Port Arthur, which was subsequently connected with the Trans-Siberian and Manchurian railroads.

The Russian Revolution of 1917 had extended its influence to the far-eastern extremes of Siberia by the end of that year. The geographical location and political contacts of Siberia with China, Japan, and America, as contrasted with Russia's proximity to the Central Powers, made the problem in Siberia a separate and difficult one. Western Siberia did not take kindly to the Bolsheviks, and in December of 1917 it declared its independence and proclaimed a republic. The organization was weak, and, in practically every large city, a separately organized government was set up. Many of the lesser organizations swore allegiance to the Omsk government. By July, 1918, the influence of the latter was such that it proclaimed the independence of Siberia and held control from the Urals to the Pacific, but for only a short period. In September, as a result of the Ufa Conference, an All-Russian Provisional Government was set up at Omsk with a directorate of five, but two months later it was overthrown by Admiral Kolchak, the Minister of the Marine, who proclaimed himself dictator. He was able to maintain his position only a year. In November, 1919, the Soviet forces took Omsk, and by the middle of January had advanced as far east as Lake Baikal. The entire area then became a part of the R.S.F.S.R.

The far-eastern territory formed an independent republic, but by 1922 that, too, was absorbed by the R.S.F.S.R.

A.P.

Related Subjects. The following articles will give additional information in connection with the study of Siberia:

Baikal

MOUNTAINS

Altai Stanovoi Ural Yablonoi

RIVERS

Amur Lena

Aral

Yenisei

UNCLASSIFIED

Fur and Fur Trade Kamchatka Soviet Steppes

Reindeer Russia Trans-Siberian Railway

ssia Tundra

SIBYL, sib' il, in Greek and Roman mythology, a prophetess inspired with the power of prophecy, the gift of Apollo. The most famous of these seeresses was the Cumaean sibyl, who, so the story goes, appeared before King Tarquin the Proud and offered him nine prophetic books for sale. This offer he refused, and a second offer, after she had destroyed three books, was also declined. When she appeared before him the third time, with but three books left, he bought them, paying These the price she had asked for the nine. three books were kept in the temple of Jupiter, and when it was burned, in 83 B.C., they were likewise destroyed. A collection of sibylline verses was then assembled from the cities of Greece, Italy, and Asia Minor, and deposited in the new Temple of Jupiter Capitolinus. The sibylline literature was consulted when it was deemed necessary to conciliate the gods.

SICILIES, sis' ih liz, KINGDOM OF THE TWO, a former kingdom of Italy, comprising Naples, or Southern Italy, and the island of Sicily. The name Kingdom of Naples was also often used. The island and the lower part of the mainland had much the same history from the earliest times; both came successively under Greek, Roman, Ostrogoth, and Saracen domination, and about the middle of the eleventh century, both were invaded by Robert and Roger I, sons of the Norman knight Tancred. Under Roger II, the two dominions were united and called the Kingdom of the Two Sicilies. Roger II left no male heir, and through his daughter, the wife of Emperor Henry VI, the kingdom came under the dominion of the Hohenstaufens.

This dynasty was overthrown in 1266, and the Two Sicilies fell to Charles of Anjou, brother of Louis IX of France. The rule of Charles was most oppressive, and in 1282, by means of the so-called Sicilian Vespers, Sicily threw off the yoke of the family of Anjou and

6592 SICILY

became subject to Pedro III of Aragon. Thus the two parts of the kingdom were separated, and though they were reunited for a few years after 1412, and again in 1442, they were again divided and remained so until early in the sixteenth century, when they came under the domination of Spain. Spanish rule was cruelly severe, and insurrections were frequent.

In 1707 Austria succeeded in gaining possession of Naples, by the War of the Spanish Succession, while Sicily was given to Savoy; but in 1720 Savoy gave up Sicily to Austria, receiving in exchange Sardinia. Fourteen years later, Don Carlos, son of Philip V of Spain, by a successful invasion made himself king of the Two Sicilies, thus inaugurating the reign of the Bourbon family. When the French Revolution broke out, and French armies began to overrun Europe, Ferdinand, king of the Two Sicilies, joined the coalition against France and lost Naples to Napoleon, who placed on the throne, first, his brother Joseph, and, later, Joachim Murat. After Napoleon's downfall, the two parts of the kingdom were reunited.

Various revolts occurred in the succeeding decades, but Austria forbade any concession on the part of the sovereigns to the people's demand for liberal government. Francis I, Ferdinand II, and Francis II did not need the backing of Austria to make them despotic, and their continued cruelties prepared the people to welcome the advent of Garibaldi and his forces, through whose efforts they were freed and made a part of the new kingdom of Italy, as is related in the article ITALY.

Related Subjects. The following articles in these volumes will make clear certain references and give added information:

Ferdinand II and IV Garibaldi, Giuseppe Hokenstaufen Italy (History) Naples Sicily Succession Wars Tancred

SICILY, sis' ih lih, officially SICILIA, an island in the Mediterranean Sea, separated from Italy, of which it is politically a part, by the Strait of Messina. An examination of the accompanying map will show that Sicily lies opposite the toe of the "boot," and that it is an irregular triangle in form. This island, with an area of 9,935 square miles, is the largest in the Mediterranean, and is nearly three times the size of Porto Rico. In 1936 it had a stated census population of 4,000,078. In past geologic ages, Sicily was a part of the mainland, and, like the Italian peninsula, it has a chain of mountains extending through it. Beautiful Mount Etna, which rises near the eastern coast to a height of 10,750 feet, is the loftiest peak on the island. Sicily has a fairly even climate, though "the scourge of Sicily," the sirocco, with its burning heat, sometimes visits the island.

The mountain slopes and foothills are covered with lemon, orange, and olive groves and with vineyards, and on the flat table-lands cereals are raised, but Sicily has lost its name of "the granary of Italy," because the yield of cereals is sufficient only for the needs of the people of the island. Deep-sea fishing furnishes tunny fish, sardines, coral, and sponges, and great quantities of sulphur are mined. Sulphur, fruits, vegetables, salt, wine, oil, and fish are the chief exports. The people are for



LOCATION MAP

The small corner map shows the island with all of
Italy (which see, for political map of Sicily).

the most part poor, although there are a few wealthy landowners. Electric power is transmitted across the strait from the mainland, over wires supported by towers 1,100 feet high.

Situated as it is, between Europe and Africa, the island has been a battlefield for the two continents. The first settlers in Sicily, probably invaders from Italy, were conquered by the Greeks, who founded colonies-Naxos. Syracuse, Agrigentum, and others—and introduced Greek culture into the island. Everywhere in Sicily today the traveler finds traces of that Greek civilization in the crumbling ruins of temples and tombs. Phoenicia, Carthage, and Rome, all included Sicily in their conquests. The Goths and Vandals, barbarian hordes from the north, drove the Romans out of Sicily, to be themselves driven out when Belisarius conquered the island and annexed it to the Byzantine Empire. Byzantine rule was replaced by Saracen, and that in turn by Norman, when the island became part of the Kingdom of the Two Sicilies. See Sicilies, Kingdom of the Two.

On July 10, 1943, American, British, and Canadian troops landed on the southeastern coast, and completed the conquest of the island with the fall of Messina on August 17. Sicily then became a springboard for the invasion of Italy. See WORLD WAR II.

The cities include:

Catania, on the lower slopes of Mount Etna, is sixty miles southwest of Messina. It has repeatedly been visited by earthquakes—one in 1693 practically destroying it—and has been partially buried under

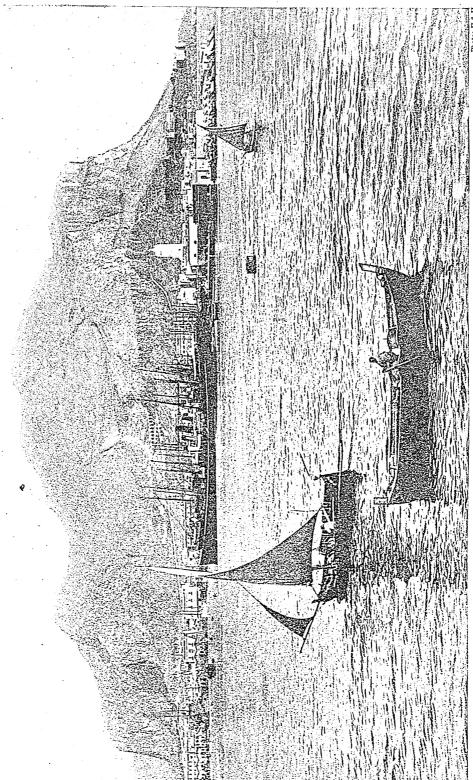


Photo: The Beautiful Location of Palermo. Rising from the blue Mediterranean, Mount Pellegrino provides a rugged background for the city nestling at its base,

lava from Etna's eruptions. It is an old town, and was a place of importance in old Roman times. Silk is manufactured. Catania exports the island's products. Population, 244,972 (1936).

Messina, mes e' nah, on the northeast coast, at the nearest approach to the mainland, on the Strait of Messina, is an important commercial center, noted for its exports of tropical fruits, wines, and fine silk, linen, and damask. The city was supposed to have been founded in the eighth century B.C. by pirates. About 500 B.C. it was a well-known Greek colony, and the Greeks gave it its present name.

Messina was the cause of the First Punic War, at the end of which it came into possession of Rome. After the fall of Rome, it belonged to the Saracens, Normans, Hohenstaufens, and Spaniards, and since 1861 has been a part of Italy. Besides being much damaged in the many wars and several earthquakes of ancient times, Messina suffered in the French and Spanish War of 1671-1678, and by plague in 1743. In the disastrous earthquake of 1908, it was totally destroyed, but was at once rebuilt; the traveler now sees a modern city, on an unusually beautiful bay, at the foot of great rugged hills. Population, 192,051 (1936).

Palermo, pal ur' mo, on the northwestern coast, is the island's largest city. It has a history which dates back to the Phoenicians. When Carthage was a world power, Palermo was its stronghold in Sicily, and in turn it was under the domination of the Romans, Saracens, Normans, Germans, and French. In 1820, 1848, and 1860, the city revolted against the Bourbon kings of Naples and was freed. It is now the capital of its province. Fisheries are extensive, and the town exports tropical fruits, oils, and wine. Population, 411,879 (1936).

Related Subjects. See the following articles:

Etna Punic Wars Italy Sicilies, Kingdom Mafia of the Two

Sirocco Sulphur Syracuse

SICKLE. See REAPING MACHINE. SICK MAN OF EUROPE. See TURKEY. SIDDHARTHA, sih dahr' tah, the given name of Buddha

(which see)

SIDDONS, sid'unz, Sarah Kemble (1755-1831), the most famous English actress of her time, was born at Brecon, Wales. Her professional life began very early. When she was eighteen years old, she married William Siddons, and the couple played in various country towns. Mrs. Siddons first attained fame at Cheltenham, England, in 1774. Some members of the nobility at-



MRS. SIDDONS

tended her performance there of Belvidera, in Otway's Venice Preserved, with the avowed purpose of ridiculing her, but remained to

applaud her. Through them, she was engaged by David Garrick, manager of Drury Lane Theater, London, but was unsuccessful at that time. Garrick, however, recalled her its 1782, and as Isabella in Southerne's Fatal Marriage, she achieved one of the greatest triumphs ever seen in a British theater.

She died in London, and was buried in Paddington Churchyard in that city.

[Mrs. Siddons acted many famous classic parts; best adapted to her striking figure, brilliant beauty, and weird majesty were the rôles of Lady Macbeth in Shakespeare's Macbeth, Queen Catharine in his Henry VIII, and Volumnia in Kemble's version of Coriola-

SIDEREAL, sih de' re al, PERIOD.

Moon (Orbit, Size, and Distance).
SIDEREAL TIME, time measured by the apparent motion of the stars. In reality, a sidereal day is the exact time taken by the earth in revolving once on its own axis. Astronomers consider a sidereal day as the time between the passage of the vernal equinox across the meridian and the instant of its next passage, amounting to 23 hours 56 minutes 4.091 seconds. A sidereal year is the period in which the earth revolves once around the sun, or in which the sun apparently completes its revolution, returning to the same place in the heavens. The length of the sidereal year is 365 days 6 hours 9 minutes 9.54 seconds. F.B.L.

Related Subjects. The reader is referred in these volumes to the following articles:

Chronology Day

Earth (Motions) Time

SIDERITE, sid' ur ite, carbonate of iron. See Carbonates.

SIDE-SADDLE FLOWER. See PITCHER PLANTS.

SIDING. See LUMBER (Purchasing Lumber).

SIDNEY, ALGERNON. See Rye House

SIDNEY, SIR PHILIP (1554-1586), an accomplished British courtier, poet, and soldier who was a popular idol during part of the reign of Queen Elizabeth. As he was the nephew of Dudley, Earl of Leicester, his career at court was assured, and he was most favorably received by the queen, who employed him in important missions. Offending her, however, by his outspoken objection to her proposed marriage with Henry, Duke of Anjou, Sidney was compelled to retire from the court for a few months, during which he wrote his Arcadia and various poems for the entertainment of his sister, the Countess of Pembroke. Elizabeth's anger soon abated; he was restored to favor and forbidden to sail with Sir Francis Drake against the Spaniards, as the queen said that she could not spare "the jewel of her dominions."

While serving as governor of Flushing, in the Netherlands, Sir Philip was mortally wounded at the Battle of Zutphen. As he was

being borne off the field, he complained of thirst, and water was brought to him. Seeing the wistful look on the face of a mortally wounded soldier, Sidney handed over the water, saying simply, "Thy necessity is greater than mine."

Sidney's death was greatly mourned. His body was taken to England and buried with great ceremony in Saint Paul's Cathedral. Though his Arcadia, a long pastoral



SIR PHILIP SIDNEY

romance, was very popular in its day, it is now

read only by scholars. His Astrophel and Stella, however, a series of love sonnets, and his critical essay in prose, A Defense of Poesy, are of perennial worth and interest.

SIDON, si' don. See Phoenicia (Cities). SIEGE, seej, a word derived from the Latin sedere, meaning to sit. Literally, a siege consists in stationing an army before a defended place for the purpose of taking it by assault or by starving it into surrender. The first object of the besieging force is to invest or surround the position, to prevent outside help or supplies from reaching the besieged. Artillery is placed at important and commanding positions, and the attackers advance openly to the assault, or from trench to trench dug parallel to the works of the enemy. The digging of the trenches is a difficult and dangerous undertaking, and must be carried on under cover of artillery and rifle fire or at night.

Modern Siege Methods. Modern siege tactics have undergone considerable change since the Russo-Japanese War. In reducing a city by artillery fire, called bombardment, special guns are used, more powerful than those with the army in the field. For siege purposes, modern 8-inch howitzers, mortars, and long 6-inch siege guns have been adopted. The latter weigh about 3,660 pounds, are 12.15 feet in length, and fire a shell 45 pounds in weight. The big siege guns introduced by the German army in 1914 have an effective range far greater than any previously known, and have proved that, however well protected a position may be, the weight of metal will eventually batter down the defenses. The fortress of Verdun was the only one that withstood the German bombardment.

The modern siege guns, with a range of 12,000 yards (about seven miles), cover the

advance of attacking infantry in a way hitherto unheard of in siege tactics. By the use of such guns, together with constant nearer approach by trenches, and by utilizing all natural means of defense and concealment, modern armies accomplish in a week what could hardly be done in months in former wars. In fact, it may be safely stated that sieges, in the old

way, will not again be prominent in warfare.
Famous Sieges. The most famous recent sieges are those of Paris (Franco-German War), 1871; Plevna, Bulgaria (Russo-Turkish War), 1877; Mafeking, Cape of Good Hope Province (Boer War), 1899-1900; Port Arthur, Manchuria (Russo-Japanese War), 1904-1905; Przemysl, Poland (World War), 1914-1915; Verdun France (World War), 1916. In the first stage of the World War, in 1914, the siege of Antwerp was characterized by none of the former principles of siegecraft. Weight and numbers and long range of guns on the part of the Germans quickly overpowered the besieged, and Antwerp was taken in eleven days; whereas, by former siege methods and appliances, six months might have been required, for the fortifications of Antwerp were among the strongest in the world. The Russian siege of Przemysl was stubbornly contested for six months; at Verdun, the unfaltering resolution of the French, expressed in the words "They shall not pass," inspired the defense to almost incredible deeds of valor.

Among the greatest recorded sieges are: Twelfth century B.C.—Troy, ten years. Fell. 1428-1429-Orleans, seven months. Relieved by Joan of Arc.

1779-1783-Gibraltar, three years seven months

fifteen days. Great Britain won. 1855—Sebastopol, 316 days. Fell. 1857—Delhi, 132 days. Relieved.

1857—Lucknow, 141 days. Relieved.

1862-1863—Vicksburg, 186 days. Fell. 1864-1865—Richmond, 287 days. Evacuated.

1870—Metz, 70 days. Fell. 1870-1871-Paris, 130 days. Fell.

1877-Plevna, 144 days. Fell.

1899-1900—Ladysmith, 118 days. Relieved. 1904-1905—Port Arthur, 241 days. Fell.

1012-1013-Adrianople, 155 days. Fell.

1914-1915—Przemysl, 185 days. Fell. 1916-Verdun, 298 days. France won.

1936-Alcatraz, 68 days. Fell.

1941-1942—Leningrad, 455 days. Relieved. 1942-1943—Stalingrad, 166 days. Relieved.

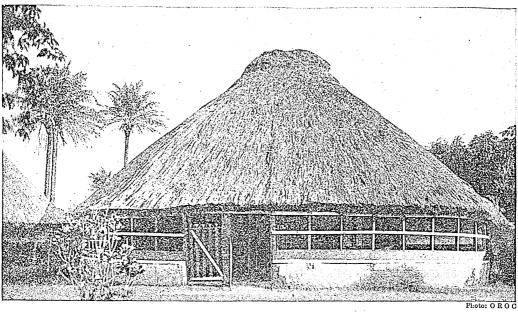
Related Subjects. The reader is referred to: Balkan Wars Russo-Japanese War

Crimea Franco-German War Gibraltar Hundred Years' War Joan of Arc

Sepoy Rebellion South African War Troy War of Secession World War

SIEGE PERILOUS, one of the seats of the Round Table (which see).

SIEGFRIED. See NIBELUNGENLIED. SIEGFRIED LINE, or WESTWALL. World War II.



PALACE OF A LOCAL CHIEFTAIN IN SIERRA LEONE

SIENKIEWICZ, shen kya' vich, HENRYK (1846-1916), a Polish novelist, best known as the author of Quo Vadis, a vivid story of ancient Rome in the days of Nero. It has been dramatized both for the regular stage and for the moving-picture theaters, and always with

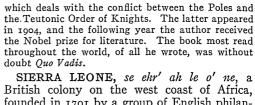
telling effect. Sienkiewicz possessed in a remarkable degree the power to visualize historic scenes and characters, and his stories are intensely interesting and powerfully emotional.

He was born in the province of Siedlce. After his student days at the University of Warsaw, he visited California, writing an account of his journey

California, writing an account of his journey in a series of letters published in the *Polish Gazette*. Thereafter, his sole occupation, until near the close of his life, was writing. When the World War began, Sienkiewicz devoted most of his time to Polish relief work. He died in Switzerland,

Chief Works. His first novel, The Tatar Bondage, published in 1880, was a great success, and was followed by a trilogy having as a background the struggle between the Poles and Cossacks. The three books of this series are entitled With Fire and Sword, The Deluge, and Pan Michael. Among his other widely read novels are Children of the Soil, a story of contemporary Polish life, and Knights of the Cross.

while on a mission for his prostrate country.



SIERRA LEONE, se elir' ah le o' ne, a British colony on the west coast of Africa, founded in 1791 by a group of English philanthropists, as a refuge for fugitive Negro slaves. Also, a protectorate proclaimed in 1896. The area of the colony is 2,500 square miles; of the protectorate, 27,669. The protectorate, with population of 1,672,000 (1931), is governed by the colony (population, 121,100 [1940 estimate]). See Africa (map).

The country is hilly, well wooded, and well watered, and the coast regions are very unhealthful. There are valuable woods in the forests, chiefly teak, ebony, and rosewood; and many wild animals, including elephants, leopards, panthers, monkeys, and buffalo. In the rivers are crocodiles and hippopotamuses; serpents, especially boa constrictors, are numerous. The chief exports are the products of the oil palm and kola nuts. Ginger is one of the less important exports.

Freetown, the capital city, is the most important seaport in West Africa. It has an excellent harbor, and is one of the principal African coaling stations for the British navy. A railroad extends inland from the city and crosses the colony. The population of Freetown is 80,000 (1940 estimate).

SIERRA MADRE, mah' dray, the name given to a number of mountain ranges in territory that was once Spanish, and also to a range in Spain. The best-known ranges of











this name are in Mexico and on the island of Luzon, in the Philippines. In Mexico there are the Western (Occidental) Sierra Madre and the Eastern (Oriental) Sierra Madre, the two ranges which border the great plateau. One of the ranges of the Coast Range of California is the Sierra Madre. See MEXICO (The Central Plateau).

SIERRA NEVADA. See Spain (The Land). SIERRA NEVADA, the highest and steepest mountain range in the United States, extending north and south for more than 400 miles, through Eastern California. To the west of the range are the valleys of the Sacramento and San Joaquin rivers, and to the east lies the Great American Basin. The highest peak in the United States proper, Mount Whitney (14,496 feet), belongs to the Sierra Nevada range, and there are many others more than 10,000 feet above the sea. Among the places in the Sierra Nevada famous for beautiful scenery is the Yosemite Valley (see Yosemite NATIONAL PARK). See also California (Surface Features).

SIEVE-TUBE SYSTEM. See STEM.

SIEYÈS, sya yes', EMMANUEL JOSEPH (1748-1836), a French Revolutionist, born at Fréjus. Educated for the priesthood, in 1775 he was appointed a canon in Brittany, and rose rapidly to the post of vicar-general. He was in Paris in 1789, and actively furthered the French Revolution. On June 16, as a member of the States-General, he proposed that that body organize the National Assembly; this was done, and Sieyès was chosen its president in 1790. In the next year, many violent leaders went to such extremes that Sieyès could not follow them, and he became almost a silent member of the

After the Reign of Terror (see French Revo-LUTION), Sieyès did important work in the Department of Foreign Affairs, and in 1798 went as ambassador to Berlin. In 1799 he was elected a member of the Directory of Paris, and greatly aided the movement for peace by closing the Jacobin Club (see Jacobins). On November 9, 1799, he formed what was called a consulate, of which he and Napoleon were members. No man, however, could oppose the will of Bonaparte, and, after a few disagreements, Sieyès retired with a gift of \$120,000, an estate, a seat in the Senate, and the title of Count of the Empire.

SIF, seef, wife of Thor (which see).

SIGHS, BRIDGE OF. See BRIDGE OF SIGHS. SIGILLARIA. See SATURNALIA.

SIGISMUND, sij' is mund, an early ruler of

Austria. See Austria (History).

SIGMA XI, sig' mah zi, an honorary scientific society founded at Cornell in 1886 to promote research. It elects to membership men and women who have done notable research work; undergraduates excelling in science are made associates. In the Society's sixty-six chapters are about 12,000 people.

membership totals over 25,000.

SIGNAL CORPS, kohr, a branch of the Army. The history of the Signal Corps of the United States Army dates from 1860, when Major Albert J. Myer was appointed as a signal officer on the staff of the army, the sole member of the Corps. In 1863, the Signal Corps was established as a separate branch of the army and Major Myer was appointed as the first Chief Signal Officer of the army, and promoted to the rank of Colonel.

As its name implies, the Signal Corps comprises the communications system of the army. The insignia is a flaming torch and crossed flags. When adopted many years ago, this insignia correctly pictured the most generally used signaling equipment. Today, of course, the vast bulk of the tremendously increased flow of military communication is carried on by invisible electrons racing through wires, and by invisible radio waves flashing across space. The Signal Corps also has many supply responsibilities since it develops, procures, and supplies signal, meteorological, and photographic equipment for the army.

The Signal Corps of the United States Army is administered by a Chief Signal Officer with the rank of Major General. In war, Signal Corps troops handle all signal communication at the headquarters of divisions and larger units, and at general headquarters of the whole army. The infantry, cavalry, and field artillery install and operate their own signal communication system in the forward areas of the

battle fronts.

Members of the regular Army Signal Corps operate scores of post telephone systems, radio stations, several depots, research and development laboratories, one photographic laboratory, the Signal Corps School, and many other smaller facilities and establishments. Backing up the Signal Corps of the regular army and National Guard were more than 2,000 fully trained officers of the Signal Corps Reserve. When the United States entered World War II (which see) in 1941, there were 2,064 officers and 36,762 enlisted men in the Signal Corps. These numbers were greatly increased during the progress

of the war.
The Signal Corps has been called upon four times in its history to organize services which were comparatively unrelated to its primary duty. By Joint Resolution of Congress in 1870, the Signal Corps organized the first national weather service for the United States. By 1878 there were 224 Signal Corps weather observation stations, each making eight reports daily. Operation of the civilian weather service was thus absorbing the attention of the Signal Corps at the expense of its important military duties. This service was therefore transferred to the 6598

Department of Agriculture in 1891 and the present Weather Bureau was organized. The Army had no meteorological service from 1891 until 1917, when General Pershing initiated the organization of a military meteorological service for the American Expeditionary Forces in France. This service was found so valuable that a small meteorological organization was continued after the War. With the expansion of the Air Corps in the two decades following World War I, the meteorological service became of increasing importance. After it had been built up by the Signal Corps, the meteorological personnel and responsibility were transferred to the Air Corps on July 1, 1937.

The Signal Corps also organized the Army's air arm. Military balloons had been used in the Civil War and in the Spanish American War. In 1907 the Chief Signal Officer awarded a contract to the Wright Brothers for a heavier-than-air machine, thus inaugurating modern aviation in the Army. The Air Service expanded so greatly during 1917 and 1918 that it was made a separate arm in May, 1918.

The Signal Corps also organized and operates the Army's photographic service which provides still and motion pictures for training and historical purposes.

Related Subjects. The reader is referred to:

Aircraft Navy
Army Signaling and Signals
Flag Radio Communication
Heliograph Weather

SIGNALING AND SIGNALS. Signaling is the art of conveying messages by means of audible or visible signs, the significance of which is prearranged. They are used when a direct verbal or written communication is either impossible or undesirable. Circumstances and use determine the types of signals employed, and their importance is readily appreciated when one considers their serviceability at sea, in warfare, and on railroads, and the variety of adaptations, from football signals to weather forecasts.

Marine Signaling. Small, unseaworthy vessels, uncharted seas, and fear of monsters were not the only horrors that sailors experienced when they set out on their daring voyages, hundreds of years ago, for as soon as they had lost sight of land, they were out of all communication with the world. early, it is believed, the Venetians devised means of conveying short messages to other vessels or land posts within their field of vision, but beyond the sound of a megaphone. Flags of various shapes were used, and later, lanterns, lights, and sound signals. But ships remained cut off from the world when beyond sight or hearing of other vessels, until the invention of the wireless telegraph, late in the nineteenth century. Now, nearly every ship carries radio equipment, and is in constant touch with anything that is "on the air." The SOS distress signal, agreed upon by the International Radio-Telegraphic Convention of 1912, is transmitted by three dots, three dashes, and three dots. These particular letters are used because they are easy to distinguish and to send by the telegraphic code, and not because they are the initial letters of "Save our Ship" or "Suspend other Service," as is commonly believed.

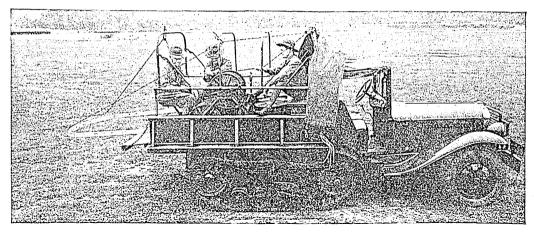
Radio, however, has not displaced all other marine signals, for provision must be made should wireless connections fail. With few exceptions, all the signals worked out use some adaptation of an international code, so that sailors of all nations may read the meaning and communicate intelligence, regardless of their native tongue. Between 1855 and 1857 the British worked out a signal system using sets of flags, which was later adopted by other nations. In 1807 an international code was established, consisting of a set of twenty-six flags and an answering pennant. The answering pennant is hoisted to announce the beginning of a flag message, and to signify that the message is understood. In 1927 the code was again revised. The flags were increased in number by the addition of ten numeral pennants and three substitute or repeater flags. The use of numeral pennants simplifies signaling of times, latitudes, longitudes, and bearings. See illustrations, page 6599.

Code books are printed in seven languages, and include the combinations to be used for urgent messages, phrases commonly used, geographical tables, and other information useful in transmitting messages quickly. flags are hoisted singly, or in combinations of from two to four. The messages most used require only one flag, which may indicate such phrases as "ship is in quarantine," or "pilot wanted." Two flags are used for urgent and important messages, ordinary messages need three flags, and geographical position is signified by four flags. Every registered ship has a signal number which is assigned it by the country whose flag it flies. Lists are published giving the name and signal number of all vessels. In order that a ship may be recognized it displays its signals—four flags, each representing a letter. The first letter or the first two letters indicate nationality. Thus for the United States the signal letters are K, N, W.

The fixed semaphore, which is used extensively in railroad signaling (see RAILROAD [Safety Devices]), was adapted for marine signaling, and was most comomnly used for coast-signal stations. The use of the mechanical or fixed semaphore was abandoned in accordance with the changes prescribed by the code conference in 1927. However, semaphore signaling by means of a signal man holding a pair of flags in his hands and forming the signs and letters with his arms is still utilized. The

Attention Interval Numerals

SIGNALING INTERNATIONAL CODE HAND-FLAG CODE Answering Pennant III red B black ☐ white ■ yellow la blue



UNITED STATES ARMY SIGNAL CORPS WIRE-LAYING TRUCK
Not only are wires laid but they can be picked up again and recled on the spools.

standard rate of such signaling is eight words per minute. Night signals necessarily require light or sound systems. Flashes of light, corresponding to dots and dashes and using the international Morse code, form the basis for most of the night signals. This form of signaling is popular with vessels. The standard rate of signaling by flashing lights in the international Morse code is eight words per minute.

The Ardois system (discontinued by the United States Navy in 1010) used by most navies, consisted of electric latterns which light either red or white. When fog or other atmospheric conditions interfere with the visibility, sound signals, such as whistles, sirens, and trumpets, using the international Morse code may be used. Sound signaling is necessarily slow, and when misused is likely to cause confusion in the highways at sea. (For fog horns Rockets and Roman candle see SIREN.) arrangements are used to attract attention and as an emergency signal. Guns and bombs are other signal devices, and hoisting the national flag upside down also signifies distress.

Military Signaling and Communication. With the increased complications of modern warfare, the development of long-distance guns, the use of airplanes, and the finished technic of strategy, systems of signaling for transmitting information and commands become more and more essential. Areas of fighting have increased, and it is no longer possible for the commanding officer to give his orders personally, or to observe the progress of his army. Means must be provided for conveying information from the rear to the front and vice versa, and, if possible, there must be a system of communication between artillery, infantry, cavalry, and air corps. A very important division of the United States army, called the Signal Corps, is organized to administer this function.

The various types of communication employed

include radio, telephone and telegraph, visual signals, homing pigeons, motor vehicles, airplanes, bicycles, horses, and footrunners. Radio is a more efficient and desirable signal device for peaceful pursuits than in warfare. It has the advantage of portability, but requires highly trained maintenance and operation personnel. The principal disadvantage, however, is the ease with which the enemy may intercept messages, and though codes are used, time is lost in translating them, and experts in the employ of the enemy are often able to work out the code. Since radio reception is subject to interference from other stations which are operating on the same or nearly the same frequency as the station whose transmissions are desired, only a limited number of stations can be operated in an area. However, radio is the principal means of communication for occupants of military airplanes, of tanks, other combat vehicles, and cavalry.

Wire communication is the most efficient and perhaps the best method, but it requires considerable equipment and mechanical attention, and it is not practical unless the location has some degree of permanence. Several lines may be established, and any number of messages transmitted with comparatively little danger of interception. Temporary lines of insulated wire may be laid on the ground and used as telephone or buzzer circuits. The most serious drawback of wire communication is the susceptibility of wire to breakage by enemy shell fire, bombs, and friendly tanks, combat cars, and other vehicular and animal traffic. During World War I, wires were buried as deep as eight feet on the more permanent lines, to avoid suspension of service.

Visual signals include several devices used by ships: flags, lights, semaphores, and formerly heliographs. This type of signal is used over short areas, for field communication between the rear and the front, and in places where more permanent connections are not practical. Flags may be used with positions to signify dots, dashes, and the pauses between words and sentences. Short and long flashes of light corresponding to dots and dashes are used at night. Semaphores and hand flags offer a rapid means for transmitting messages at short distances.

The messenger or runner method of conveying intelligence may not, strictly speaking, seem a type of signaling, but it is one of the oldest means of keeping the commanders in touch with existing conditions, giving warnings, and carrying correspondence. Homing pigeons are often used in this phase of signaling. In World War I, dogs were employed as messengers, and displayed extraordinary intelligence and bravery. Motorcycles, motor cars, airplanes, bicycles, and horses are used by dispatch-carriers; the chief danger lies in the possibility of the messenger being captured or killed and the correspondence found on him.

Communication by Aircraft. In World War I, the part to be played by airplanes and other aircraft was soon discovered; as aids to the armies, the importance of the aerial forces cannot be overestimated. While bombing may be considered the primary mission of military aircraft, aerial units also render important service to the ground elements of the army by co-operating with the artillery and army generally and by reporting the results of their observation by radio or other means of signaling. Devices have been perfected which permit transmission of maps and drawings by radio waves from plane to ground station. For scouting and for ascertaining and reporting the position and strength of the enemy and the disposition of his artillery, air observers have proved invaluable. At long range, the enemy guns are invisible, and only from the air can the correct range be found.

The daring of the air observers of all nationalities engaged in World Wars I and II was remarkable. The appearance of an airplane was the signal for bombardment. Yet, day after day, the observers returned to their duty, even engaging themselves in hundreds of deadly battles several thousand feet above the earth, sacrificing their lives in the endeavor to give their friends below the much-needed signals. Radio communication was the most effective method used between troops and aircraft, but not always practicable. Other methods are flags and smoke; from the ground, strips of white canvas and airangements of lights.

Related Subjects. The reader is referred to:

Fog (Fog Signals) Heliograph Radio Communication Railroad (Safety Devices) Rocket Signal Corps Sign Language Telegraph Telephone Weather SIGNATURE, METER. See Music (Measures and Time).

SIGNET RING. See SEAL.

SIGN LANGUAGE. The language of signs was used long before the written history of mankind began. It was the earliest means of communication employed when the use of symbols and significant gestures was necessary to convey an idea or interpret a message. This primitive method of communication is still used by certain tribes of American Indians, who have no common language. For example, the breaking of a strong stick signifies strength, and the drawing of the finger across the forehead, to indicate the presence of a cap, represents white man.

The language of signs has been used since the sixteenth century in the education of the deaf. The early teachers conveyed ideas by the use of gestures, position, facial expression, and mimic acting, which the pupil was taught to imitate. Many of the signs employed were the same natural expressions used by the Indians—the movement of the hand to the mouth to indicate food, the bowing of the head to represent sorrow or suffering, etc. The manual alphabet, by which letters are interpreted by the position of the fingers, was later introduced, but this spelling with the hands is not properly a sign language (see Deaf and Dumb).

The many systems of signs or signals employed in the government service are explained in the articles Signal Corps and Signaling and Signals, with illustrations of signaling by means of flags.

SIGNS OF THE ZODIAC. See the articles ZODIAC and ECLIPTIC.

SIGSBEE, CHARLES DWIGHT (1845-1923), an American naval officer, in command of the

Maine when it was destroyed in 1898 in Havana harbor. He was graduated at the United States Naval Academy in 1863, in time to participate in the Battle of Mobile Bay, in the War of Secession. Later, he did brilliant work in connection with deepsea soundings in the Gulf of Mexico. The year before the outbreak of the Spanish-American War, Sigsbee was promoted to the rank of captain.

CHARLES D. SIGSBEE

His cool and courageous conduct at the time of the disaster to the *Maine* was highly praised, and he was assigned to the command of the auxiliary cruiser *Saint Paul* for the period of the war. In 1903 he was promoted to be rear admiral, and four years later he retired. See Spanish-American War.

As an Author. Sigsbee was the author of Deep Sea Sounding and Dredging and The Maine: An Account of Her Destruction in Havana Harbor.

SIGURD, ze' goort, in Northern mythology, the brave warrior and hero of the Volsunga Saga, who vowed in true knightly fashion to right all evil and defend the oppressed. He was the son of Sigmundr and Hiortis, but was raised in the brilliant court of his stepfather, Alf. Incited by the stories of Regin, his tutor, the young gallant, after receiving his father's sword, started out to destroy the dragon Fafnir. After killing the monster, he ate its heart and was surprised to find that he could understand the language of birds. They told him about Brunhilde, the beautiful maiden who slept in a palace surrounded by flames, awaiting the hero who would come to rescue her. Sigurd immediately mounted the hill to the palace, and awakened the imprisoned Brunhilde, whom he loved at first sight. After promising to return for her, he started off again on his adventures. She was left sorrow-

Finally, he reached the land of the Nibelungs, where the queen, who was a sorceress, brewed for Sigurd a potion which caused him to forget Brunhilde and fall in love with her own daughter, Gudrun, whom he married. Later, he aided Gudrun's brother, Gunnar, to win Brunhilde as his wife. Brunhilde, unable to forgive his apparent faithlessness, had him put to death, and then in remorse killed herself on his funeral pyre.

The Volsunga Saga, which dates from the thirteenth century, is a primitive Norse version of the heroic epic poem Nibelungenlied (which see), in which the hero is the German Siegfried, king of the Nibelungs.

In Literature. An extract from William Morris' Sigurd the Volsung describes the death of the hero:

"It is Brynhild's deed," he murmured, "and the woman that loves me well;

Naught now is left to repent of, and the tale abides to tell.

I have done many deeds in my life-days; and all these, and my love, they lie

In the hollow hand of Odin till the day of the world go by."

SIKHS, seeks, meaning disciples, is the name of a religious sect in Northwestern India, which worships one invisible god. It was founded by Nanak Guru (1469-1539), who tried to unify the Hindu castes and unite them with the Mohammedans into one great brotherhood. The Sikhs form the larger part of the inhabitants of the Punjab. They are a strong, courageous people, and are chiefly engaged in agriculture.

The political state of the Sikhs was established by Guru Govind Singh. He developed their military power, that they might defend themselves from the Mohammedans and other religious classes, but after his death, in 1708, his followers were overcome by the Moslems. A few of the Sikhs, however, escaped to the mountains, and in a few years returned and subdued Lahore. They established independent communities which were united in 1792 by Ranjit Singh, a despot who assumed the title of maharajah and governed a territory including all of the Punjab and Multan, and other adjoining regions, with a total area of 70,000 square miles. After his death, the Sikhs came into conflict with the British government in India. In the First Sikh War (1845-1846), they were defeated and forced to give up Lahore. In 1848, during the Second Sikh War, they were completely conquered, and their possessions were added to British India.

In the Sepoy Rebellion of 1857 (which see), the Sikhs supported the English, chiefly through fear that the Mohammedan power might be restored in India. Great Britain has found the Sikhs excellent soldiers, amenable to discipline, brave, steadfast, and unmoved by victory or defeat. There are now over

3,200,000 Sikhs in India. SI KIANG, se' kyahng, the most important river of southwestern China, has its source in the province of Yunnan and flows in a southeasterly direction for about 1,650 miles, discharging through its delta into the South China Sea. Canton, one of the largest cities in China, is situated on one of the arms of the Si Kiang. The river is of considerable commercial importance, through its tributaries and a network of canals. It is navigable for the largest vessels as far as Wuchow, and from Wuchow to Samshui for lighter craft. Rapids interrupt navigation in the upper course.

SILAGE. See SILO AND SILAGE.

SILENCE, TOWERS OF. See TOWERS OF SILENCE.

SILENUS, si le' nus, in Greek mythology, a demigod, the most distinguished of the satyrs. He was the nurse, teacher, and follower of Bacchus. He is represented as very fat, bald, and pug-nosed, riding on a broad-backed ass. He is usually pictured as intoxicated, swaying about, and brandishing his drinking cup. See SATYR.

SILESIA, si le' shi ah, an area in Central Europe, lying partly in Prussia, Moravia, and former Poland. Before World War I, Silesia was the name of a Prussian province and an Austrian crownland. The present Prussian Silesia is divided into the provinces of Upper and Lower Silesia, officially Schlesien. Located in Southeastern Germany, they originally had an area of 15,569 square miles, but now the area is about 14,000 square miles and the population, about 4,512,000. They

comprise one of the important industrial areas of Germany. The Moravian section, Slezsko in Czechoslovakia until 1939, has an area of 10,324 square miles and an estimated population of 3,563,157 (1930). The Polish county of Silesia (now German) had an area of 1,633 square miles and a population of 1,298,851 (1931). The Oder River system drains most of

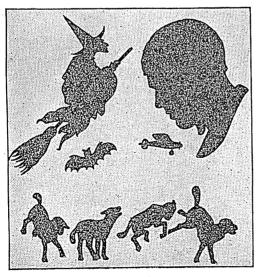


WINTER IN SILESIAN MOUNTAINS

A mountain hotel, the Reiftraeger Bande (King Winter's Own Castle), on the slopes of the Schneckoppe, highest peak of the Giants' Mountains in Silesia.

this region, making it an important agricultural and manufacturing area. Valuable coal fields add to Silesia's commercial importance. See CZECHOSLOVAKIA; POLAND; PRUSSIA; GERMANY.

SILHOUETTE, sil oo et', a drawing of any object in outline, which is filled in with a solid color. It appears as though it were a



SILHOUETTES

shadow cast by reason of a strong light. Usually limited in meaning to outlines of the human head, the word may refer as well to any solid, flat-surface representation; any

shadow picture may be so called. In recent American usage, the term is applied to an outline of the feminine figure, especially the fashionable figure of the day.

Derivation. The silhouette was named for Etienne de Silhouette (1709-1767), a French Minister of Finance who was so rigidly economical that he often withheld funds from worthy objects. His name came to be applied to anything imperfect or incomplete, and eventually to the kind of picture described above, which has no detail and lacks the lines to make it a complete representation.

SILICA, sil' ih kah, the most abundant and widely distributed mineral compound in the earth's crust, of which it is estimated to constitute sixty per cent. In the form of quartz, it is the chief constituent of most sand and an essential constituent of most varieties of crystalline rocks. In chemical combination with other substances, it forms part of many minerals, which are grouped under the general name of silicates. It imparts strength and toughness to the stalks of some plants, the quills of birds, and some forms of living sponges, and it forms the shells of some microscopic forms of life.

Silica is an oxide of silicon, with the formula SiO₂. It is found in nature in both crystalline and amorphous (without definite structure) forms. It is insoluble in water, and in all mineral acids except hydrofluoric acid. Crystalline silica forms the common mineral quartz and the rare minerals tridymite and cristobalite. Some varieties of precious stones, such as amethyst, jasper, and one kind of cat's-eye, are quartz delicately colored in Other precious and semivarious shades. precious stones, such as opal, onyx, and chalcedony, are amorphous silica variously colored. Flint and chert are amorphous silica which is colored black or dull brown by iron oxide and contains more or less alumina and other impurities.

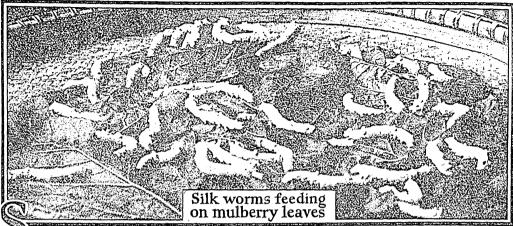
Related Subjects. The reader is referred in these volumes to the following articles:

Crystallization Minerals

Sand Sandstone

SILICON, sil' ih kon, a non-metallic element, the most abundant in nature with the exception of oxygen, although it does not occur uncombined. Natural silica, or silicon dioxide, is the principal constituent of quartz, flint, sand, amethyst, agate, jasper, opal, and many other rocks, in most of which it occurs in the form of crystals (see Silica). Silicon occurs also as a brown powder, which will burn in air and chlorine, and is soluble in alkalies. The chemical symbol for silicon is Si. See Chemistry (The Elements).

SI LING-SHI, a Chinese empress, the central figure in a legend connected with the beginning of silkworm culture. See Silk.



ILK. There are four principal textile materials used to clothe the world—cotton, linen, wool, and silk. Of these, silk is the most beautiful, and has the most interesting and romantic story. Cotton and linen are woven from plant fibers, and wool, we know, grows on the bodies of sheep. Silk fibers are like none of these, for they are spun by the caterpillar of a moth, and are made of a sticky secretion formed by glands inside the worm's body. Costly and beautiful, associated with luxury and royalty, silk owes its origin to a lowly member of the insect world.

"On a plain rush hurdle a silkworm lay
When a proud young princess came that way.
The haughty daughter of a lordly king
Threw a sidelong glance at the humble thing,
Little thinking she walked in pride
In the winding sheet where the silkworm died."

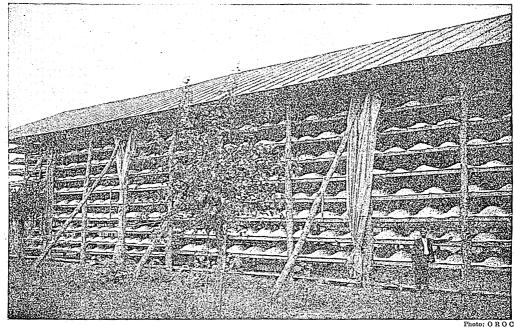
These lines remind us, though they do not give the real story, of the legend of the Empress Si Ling-Shi, a Chinese lady who is said to have lived in 2700 B.C. The young empress, sitting one day in her garden, became greatly interested in a caterpillar that was spinning a shining cocoon about its body, on the branch of a mulberry tree. In imagination she saw herself unwinding the delicate filaments from many cocoons, and wearing a beautiful garment woven from lustrous threads. Then she persuaded her husband to give her a grove of mulberry trees, in which she spent many happy hours caring for the eggs and worms, learning the secret of silk culture.

Whether or not the story is true, the name silk is derived from that of the little empress; in China to-day, the word is written si, and the French spell it soie. It is an historical fact, moreover, that the cultivation of the silkworm originated in China over twenty centuries before the time of Christ. For more than 2,000 years, the Chinese carefully guarded the secret of the silk moth, and carried on a prosperous trade in silk goods with other Asiatic

peoples. Anybody who tried to carry the eggs of the moth out of the country stood in danger of death. There are stories of eggs smuggled into Japan and India, about A.D. 300, but the Emperor Justinian, who reigned at Constantinople in 527-565, is credited with establishing the industry in the Roman Empire. He is said to have bribed two Persian monks who had lived in China to return to that country and bring back to him some of the desired eggs. They succeeded in their mission by concealing the smuggled objects in their hollow bamboo The Chinese process of winding the staffs. fibers on reels was also revealed to outside countries about this time. The Moors introduced silk culture into Spain in the ninth century, and it spread to Italy in the twelfth. Florence, Venice, Genoa, and Milan grew to be famous centers of silk manufacture. In the next century, the French became rivals of the Italians as silk-makers, and the industry was carried to England by Flemish weavers in the sixteenth century.

In Europe to-day, the production of raw silk is carried on most successfully in France and Italy, and the only other countries having an appreciable output are Japan, China, India, Persia, and Turkey. Japan, China, and Italy are the leaders, in the order named. Repeated attempts have been made to produce raw silk in the United States. However, the amount of hand labor involved in removing the filaments from the cocoons and winding them on reels makes it impossible for American producers to compete with those of Europe and the Orient, where individuals are paid so little for hours of painstaking work that the price of silk remains low as compared to that in the United States.

The Spinner and Its Work. Wild silk moths lay their eggs in trees and the larvae shift for themselves, but the lustrous silks of our markets are produced by little creatures as truly domesticated as milk cows and farm poultry. The cultivated silk moth, in fact,



THE SILK INDUSTRY IN SOUTHERN RUSSIA A drying loft on the east shore of the Black Sea.

through centuries of domestication has lost the power of flight; if restored to a state of nature, it would succumb to attacks of its natural enemies. Even under cultivation, it easily falls a victim to various infectious diseases. The moth has a short, blunt body, stout legs, and broad, white wings marked with several black lines. From tip to tip of outspread wings, it measures about two inches. In early summer the female lays from 200 to 500 yellow eggs (gray or lilac when fertilized), each about pinhead size. Deposited on specially provided strips of cloth or paper, they are kept in cold storage through the winter.

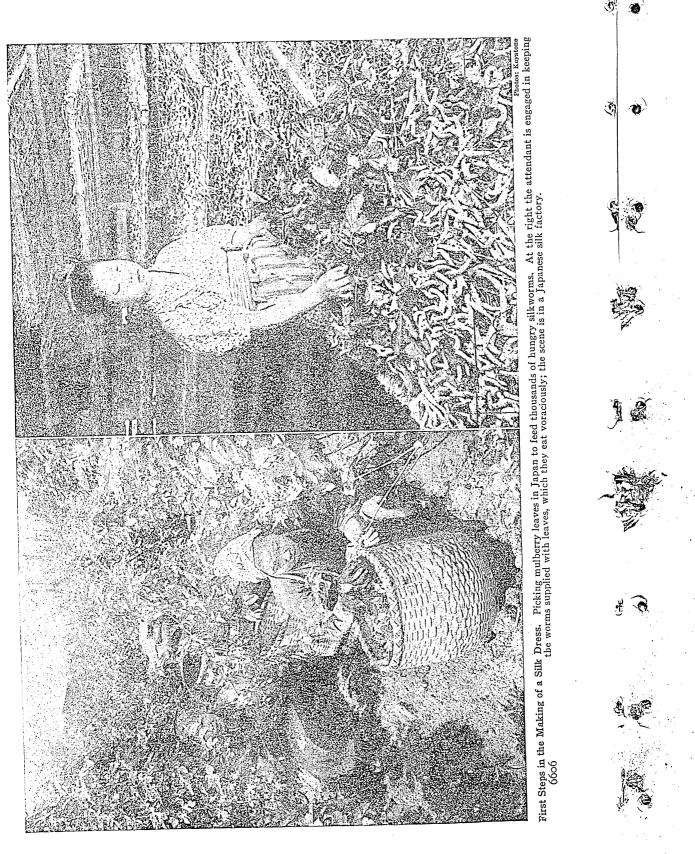
In the spring the eggs are hatched by artificial heat, and the young worms, which are an eighth to a quarter of an inch in length, begin feeding greedily on mulberry leaves. A variety of the white mulberry is the tree now grown for silkworm culture. So voracious are the appetites of the worms that each is soon consuming its own weight of chopped leaves daily. The rapidly growing caterpillar sheds its skin four times in a period of about five weeks, and then makes ready for the next stage of its life history. By this time it is three inches long and half an inch in diameter. The body is in twelve segments, and is supported by three pairs of true legs and five pairs of hooked prolegs on the hind segments.

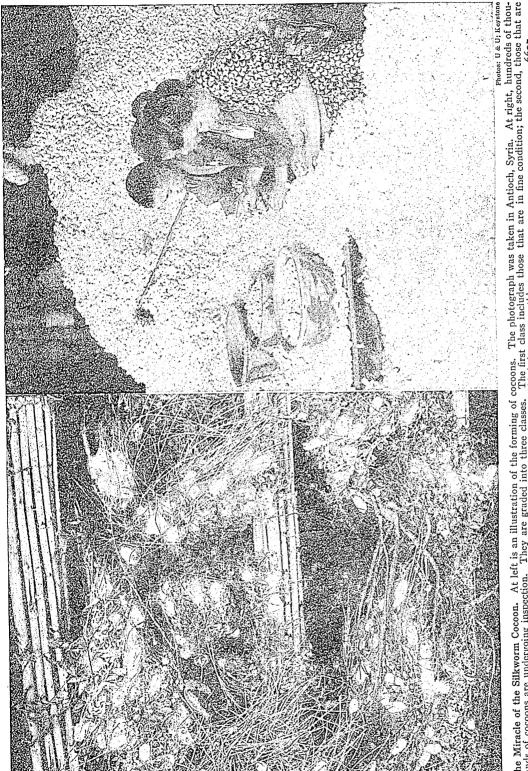
When full grown, the caterpillar ceases to eat, and presently begins spinning its cocoon. In a natural state, it sews two leaves together and spins the cocoon between them; under

cultivation, however, the worm is supplied with a rack containing numerous small cells, to the sides of which the cocoon is attached. The outer covering, or floss, is first spun, and then the silk is wound in a continuous thread about the body, the worm shrinking in size as it thus spins out its substance. The film is formed from a gluelike material secreted in two glands, one on either side of the body, connecting with an opening in the upper lip called the spinneret. The sticky fluid hardens on contact with air; under the microscope it appears as a thread of two strands. thread is sometimes 1,000 yards long; more often, the length does not greatly exceed 500 yards. Each filament is so fine that it would require about a thousand miles of it to make a pound. If left undisturbed, the pupa will emerge in two or three weeks, boring its way through the shell and appearing as a small, white moth. In cocoons from which silk is to be drawn, the insect is killed before it attacks its silky sheath. This is accomplished by placing the chrysalis in a hot oven, exposing it under glass to the rays of the sun, or subjecting it to a steam bath. Some cocoons, of course, must be left to provide for the next crop of caterpillars.

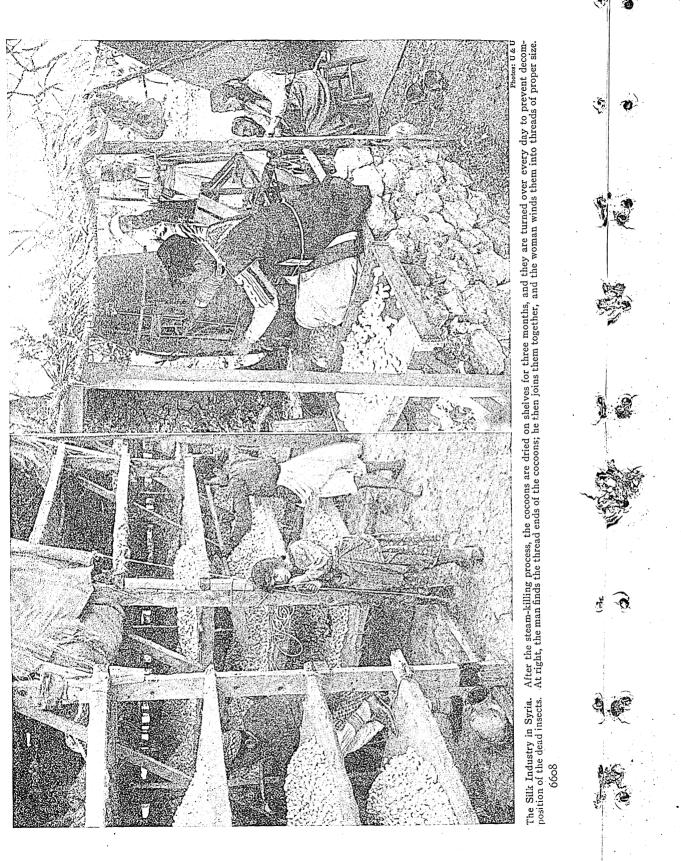
From the Cocoon to the Loom. The process of removing the filaments from the cocoon and reeling them is a laborious one, and the quality of the raw silk depends greatly upon the skill of the worker. In France and Italy,

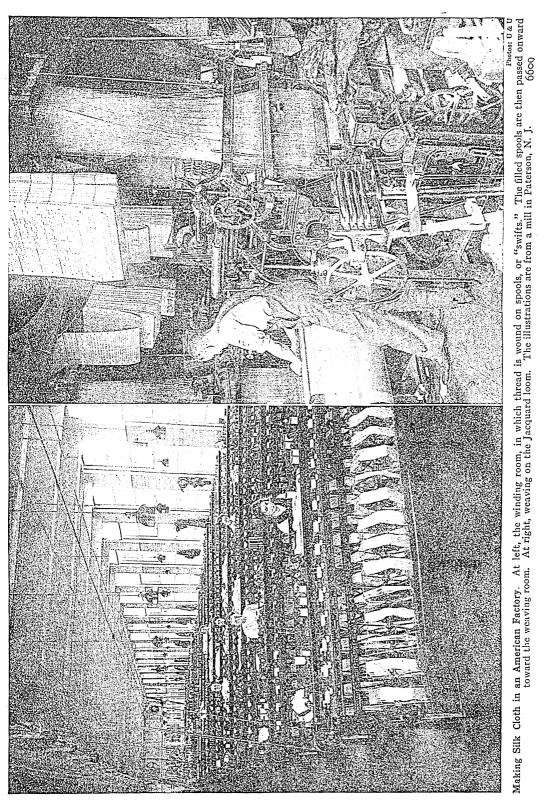
(Continued on page 6610)





The Miracle of the Silkworm Cocoon. At left is an illustration of the forming of cocoons. The photograph was taken in Antioch, Syria. At right, hundreds of thousands of cocoons are undergoing inspection. They are graded into three classes. The first class includes those that are in fine condition; the second, those that are sands of cocoons are undergoing inspection. They are graded into three classes are worthless.





improved machinery supplements hand work, but in many parts of the Orient, the old methods are still employed, and little girls perform much of the labor. The cocoons, after being sorted as to quality and color, are steeped in warm water in order to soften the gum that holds the filaments together. Meanwhile, a worker stirs the cocoons about with a small brush, which catches hold of the short, loose fibers that cannot be reeled. When these are

removed, the reelerfinds the ends of the long, continuous filaments of the cocoons, and, since a single fiber is too delicate for manufacturing purposes, runs four or five of these fibers through a metal or porcelain guide similar to the eye of a needle. These strands stick together because of the silk gum, and so come out of the guide as a single thread. The strengthened thread is then wound upon the reel, and when a bunch of silk is taken off and twisted, it becomes a skein or hank of raw silk. The raw silk imported by the American manufacturer is usually in this form.

There are several steps, however, between the hank of raw silk and the silk dress of the lady. In the factory, the material undergoes a number of operations that together make up the process called throw-

ing. First, the raw silk is rewound into bobbins. It is then cleaned and freed from knots or imperfections by being passed through two fixed plates. Next, the threads from a number of bobbins are doubled; that is, united to form When two or more of one stronger thread. these threads are combined and twisted together, tram silk is made, which is used for the woof in weaving. Organzine, which is used for the warp of heavier fabrics, is made by twisting two or more single threads separately in the same direction, and then doubling and retwisting them in the opposite direction.

When the silk is taken from the throwing machinery, it still has too much of the natural gum adhering to the strands, and is put through a degumming, or scouring, process, by being boiled in a solution of hot soap. In

addition to removing the superfluous gum, scouring prepares the silk to take the most brilliant hues in dveing. In the process, however, it loses from twenty-five to thirty per cent of its weight, and this loss has resulted in the use of still another process, known as loading, or weighting. By means of various chemicals which take up the dye, particularly salts of tin, silk may be weighted up to an amount far in excess of the loss from scouring,

but such weighting is regarded as adulteration. Too much loading causes the silk fabric to crack and fray after a short time, and the better grades of material are unweighted or loaded only enough to offset the loss from scouring. A woman who buys a piece of pure-dye silk may know that she is getting unweighted goods.

Weaving. Silk is woven on looms similar to those used for cotton and wool (for description, see the article WEAVING). Power looms have now supplanted hand looms very largely, but in China, where cheap labor prevails, weaving is still a handcraft. The United States is the most important silkconsuming and silkmanufacturing country in the world, for silk garments are now worn by all classes in Amer-

ica, especially by women. Silk hosiery, underwear, and dresses are no longer the exclusive mark of wealth and aristocracy. The first silk mill was set up at Mansfield, Conn., in 1810. Power looms appeared about 1838, and the weaving of silk fabrics spread throughout the Eastern states. Of late years, the growth has been exceedingly rapid, the manufacture of finished products ranking now among the country's great industries. The industry is centered in the East, the leading states being New Jersey, Pennsylvania, New York, Connecticut, and Massa-chusetts. Next to the United States, France is the chief silk-weaving country.

Spun Silk. The waste in silk is considerable, because only about seven-tenths of the filament can be unwound from the cocoon. This waste, together with the coarser flossy covering

A Booklet on Silk

Use two sheets of paper 9x12 inches, or larger, and fold once, making eight pages. Cover page-Story of Silk in center; name of school and pupil's name at bottom. Illustrations: Border of conventionalized mulberry leaves (see illustration under MULBERRY); several moths in flight.

Inside cover-Blank.

Page three-Essay, The Moth and Its Eggs. Illustration: Spray of mulberry leaves, with moth and eggs on leaves.

Page four-Essay, The Worm and Its Cocoon.

Illustrations: Worms feeding on leaves; a group of cocoons.

Page five-Essay, The Making of Raw Silk (killing of grubs, loosening and winding of fiber).

Illustration: Hanks of raw silk.

Page six—Essay, Silk Weaving.
Illustration: Machine with silk wound upon it.

Page seven-A page of original designs for silks, done in colors; show stripes, plaids, and figured patterns.

Page eight—List of articles made from silk. Illustrations: Articles made from silk, as ribbons, gloves, stockings, neckties, etc.

6611

of the cocoon, and the silk taken from cocoons from which the insect has been allowed to escape, is now treated much like wool. Impurities are removed by combing, and the straightened fibers are run together until thread is formed. This is the *spun silk* of commerce. It is less strong and less lustrous than reeled silk, but is suitable for making silk yarn and machine thread, and is sometimes used for the woof in cheaper fabrics. Hat braids and dress trimmings are also made from spun silk, and it is employed in electric-wire insulation.

it is employed in electric-wire insulation. Silk Products. Varying processes of weaving and finishing give a wide variety of fabrics, such as satin, velvet, crepes, brocade, and so on. Other branches of silk manufacture include the making of ribbons, hosiery, underwear, upholstery fabrics, curtains and draperies, fringes, umbrella covers, balloon cloth, millinery accessories, and thread.

Such fabrics as pongee and shantung are woven from fibers spun by uncultivated silkworms. These fibers are called *wild silk*.

For silk substitutes, see RAYON. B.M.W.

[The silk moth belongs to the family Bombycidae. Its scientific name is Bombyx mori.]

Related Subjects. The reader is referred to:
Adulteration of Foodstuffs and Clothing Crepe Satin
Brocade Moth Taffeta
Cellulose Mulberry Velvet
Chiffon Plush

SILKWORM. See SILK.

SILKWORM GUT, a substance made from fiber drawn from a silkworm which was killed at the time it was ready to spin. The thread, after going through several interesting processes, is used to form the hook end of a fishline. It is first soaked in cold water, and then in a caustic solution. The outside covering is then taken off and the thread is dried, and, if desired, bleached white. A pound of gut can be made from about 25,000 threads. Silkworm gut is valued because it is strong and is invisible in water.

SILL, in geology. See IGNEOUS ROCKS.

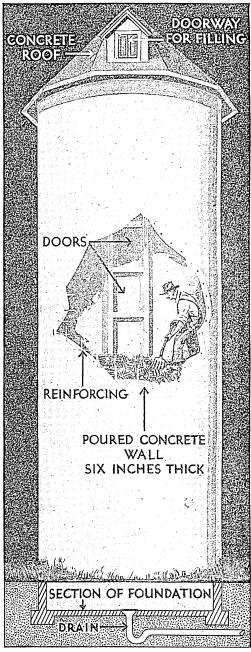
SILLANPÄÄ, FRANZ E. (1888-), Finnish author, winner of the 1939 Nobel literature prize, was born in Hämeenkyrö. He had won a large following with articles and short stories previous to the publication of his first novel Life and the Sun in 1916.

Critical acclaim in Scandinavia and other parts of Europe greeted *Meek Heritage* in 1919. Subsequently, he was granted a government pension for life, permitting full time for writing. Other writings include *The Maid Silja*, which was translated and published in America.

Stamped by clarity and accuracy, and possessing a grave majesty and pensiveness, his works deal realistically with national character and problems.

SÎLO AND SILAGE, si' layj. The word silo is applied to a tanklike structure in which

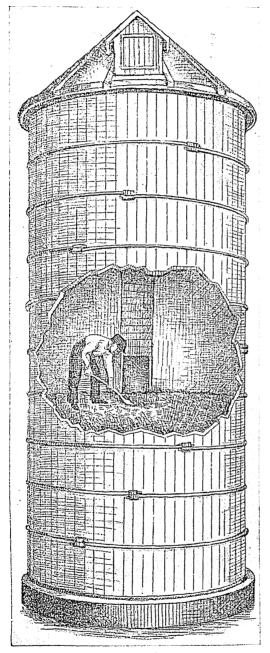
green crops are allowed to ferment and are stored for winter feed for farm stock. Silage is the term by which the feed is known. The storing of silage is of modern origin in America,



A CONCRETE SILO

having been introduced from Europe in 1875. Few well-equipped dairy farms are now without one or more silos.

Construction of a Silo. The first silos used in America were merely pits dug in the ground and covered with boards when full. These were abandoned for square wooden buildings, which were also found unsatisfactory, as the square corners prevented the proper filling of



ORDINARY WOOD SILO

the space and the exclusion of air. Next came the circular silo, which now is universally adopted as the most convenient for filling and the best for storage purposes. In some arid sections of the United States and Canada, pit silos have been found practicable. These are round holes in the ground, having the bottom and walls plastered with cement plaster. The silage is removed with a hoist and derrick.

The materials used in the construction of surface silos include stone, brick, clay tile, sheet metal, concrete, cement block, and wood in the form of staves. When wooden staves are employed, it is customary to brace them with iron hoops, though wood-hoop silos are sometimes found, especially in the Southern Cypress and redwood are the best woods for stave silos. Whatever the material, the walls must be air-tight and moistureretaining, to bring about natural fermentation and prevent decay, and must be of sufficient strength to resist pressure from within. A smooth inside surface of the walls is also essential, to insure even settling of the contents of the silo. A good foundation adds to the durability of the tank, and a conical roof will improve its appearance. Doors are built at intervals in the walls, for removing the silage as needed.

Size. Ordinarily, a farmer would not be justified in erecting a silo unless he had at least a dozen animals to feed. A silo of this capacity would have an inside diameter of ten to twelve feet, and would be thirty to forty feet high.

Silage, or Ensilage. The chief food plants used for silage are corn, clover, oats, rye, sorghum, alfalfa, cowpeas, and beans. The most desirable of these is corn. Sunflowers are used in some sections where corn does not thrive. The crop should be cut before the moisture in the plants commences to dry. The silage must be placed evenly in the silos and carefully spread in layers. One cubic foot of properly packed silage will weigh about forty pounds. As silage does not constitute the sole winter food, forty pounds will be quite sufficient for a cow's daily ration; so the amount of silage to be stored can be readily calculated on that basis. One ton of silage will feed a cow for fifty days. A herd of twenty cows fed on silage for 150 days will therefore require sixty tons of silage. An allowance of about ten per cent should be made for waste, so that sixty-six tons should be stored to produce sixty tons of food. In removing silage from the top, care should be taken that it is reduced evenly in layers and not taken more from one side than another. The top layer is, of course, most liable to spoil, especially if it is allowed to become uneven. To keep the surface fresh, it is necessary to remove at least two inches daily.

Silage has proved such a great benefit to farmers that it now forms the chief winter food for farm and dairy stock. Certain chemical changes take place during storage, but the food value of silage is about the same as that of the green crop. Dairy cattle, especially, thrive on silage, as it is juicy, nutritious, and a good milk-

producer. Three tons of good mixed silage are equal in food value to one ton of good timothy and clover hay, but it must be remembered that one acre of land planted to corn will produce silage equal to four tons of hay.

There have been many arguments in agricultural circles concerning the packing of silage. Some authorities maintain that the corn or

other crops should be packed whole; others claim that it should be cut. It is now generally admitted that when cut into short lengths, the silage packs better, undergoes less fermentation, and is better preserved than when stored whole. Probably the most common length is one-half inch. F.W.D.

SILURIAN, silu' rih an, PERI-OD, the third period of the Paleozoic Era, succeed-

ing the Ordovician and succeeded by the Devonian Period. It takes its name from the Silures, a tribe of ancient Britain. The Silurian system is extensively developed on all the continents. In North America the rocks are mainly limestone and sandstone, with some shale and conglomerate. The great salt beds of New York and Michigan, and the deposits of gypsum and of hematite iron ore in the Appalachian region, were formed during this period. The life of the period was still almost wholly marine, and consisted of a great variety of marine invertebrates; fish, mainly marine, but including some fresh-water forms; and the earliest known air-breathing animals—scorpions and Myriapoda. See Geology. L.LaF.

Related Subjects. The reader is referred in these volumes to the following articles:

Devonian Period Ordovician Period Geology (Divisions of Time) Paleozoic Era

SILVER, a precious metal known and used from early times, possessing a beautiful luster and whitish color that is often referred to in descriptions of the sea and clouds. It was known to the ancient Hebrews by a term meaning pale, and the name assigned to it by the ancient Greeks signifies shining. Its chemical symbol, Ag, is derived from the Latin word for the metal, argentum.

Properties. Although harder than gold, silver is softer than copper. It is one of the most malleable of all metals, for it can be beaten into sheets one-hundred-thousandth of

an inch in thickness, or thin enough to transmit It is exceedingly ductile, capable of light. being drawn into wire finer than human hair. It is first among the metals as a conductor of heat, and is surpassed by no metal as a conductor of electricity. Its greater cost, however, prevents its replacing copper in the manufacture of electrical conductors.

Silver melts at about 1,762° F., or 961° C., and when molten has the power of absorbing twenty times its volume of oxygen. Upon solidification, the oxygen is given up, but if the metal cools too rapidly, a crust is formed before the air has escaped, and bubbles of gas, formed in the metal, burst through the crust, driving out small ball-like masses of silver. This action, occurring

only in pure silver, is known as "spitting," and may be prevented by adding a small amount of bismuth, copper, zinc, salt, or powdered char-coal. Silver is not affected by moisture, dryness, alkalies, or vegetable acids, but sulphur or sulphureted air blackens it, and thus it quickly tarnishes in rooms lighted by coal gas. Its non-corrosive properties make it valuable

for surgical uses.

Uses. As silver is too soft to stand constant wear without any hardening element, for commercial purposes it is generally mixed with copper to form what is called an alloy. Such an alloy is used in making coins, jewelry, and tableware. The United States silver coins contain 900 parts of silver to 100 parts of copper; the British have 925 parts of silver to seventy-five of copper. The term sterling, applied to solid (alloyed) silver, comes from Easterlings, Hanseatic League members who traded with eastern Europe, and whose integrity was based on the high silver content of their coins. Silver plate is an electrolytic coating of silver on a cheaper metal.

One of the most important compounds is a white solid called silver nitrate and lunar caustic. It is produced by dissolving silver in nitric acid, and is employed extensively in photography, silver plating, and in making Silver chloride, another comindelible ink. pound, is made by adding hydrochloric acid to a solution of a silver compound. This salt, together with silver bromide, is used extensively

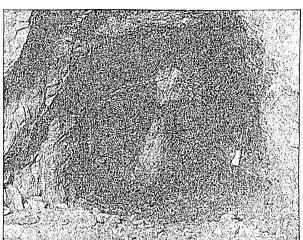


Photo: Visual Education Service A VEIN OF SILVER IN A MINE IN PUEBLO, MEXICO

in photography. In fact, this industry is the chief consumer of silver at the present time in the United States.

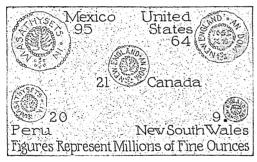
Silver fulminate is a violent explosive, but has been displaced as a constituent of explosive material by mercury fulminate and other compounds less costly. The ease with other compounds less costly.

Montana Ontario-Utah Arizona Nevada Figures Represent Millions of Dollars

LEADING STATES AND PROVINCES There are four which produce more than ten million ounces of silver each in average years.

which silver compounds are reduced is utilized in the process of silvering the backs of mirrors.

Sources. Mexico, Utah, Peru, Montana, Ontario, British Columbia, Idaho, Arizona, British India, and New South Wales are the chief regions from which native silver is obtained. The most important ores are the sulphides; that is, those containing sulphur. The richest ore, found in several parts of the United States, is *argentite*, a simple sulphide in which the proportion of silver is indicated by the atomic symbol Ag₂S. The other sulphides, found chiefly in Mexico, Peru, Bolivia, Chile,



COUNTRIES LEADING IN PRODUCTION Four countries produce each over nineteen million ounces of silver each year.

and Idaho, are complex. They include light ruby silver (arsenic, sulphur, and silver), dark ruby silver (antimony, sulphur, and silver), and brittle silver (same combining elements as dark ruby). Other important ores are horn silver, containing chlorine and silver, and hessite, a combination of silver and tellurium. Galena, the chief ore from which lead is extracted, often carries silver, and in the Coeur d'Alene district of Idaho there is a valuable mine worked for both lead and silver. In the Butte (Mont.) district, silver occurs in the copper ores, and this is also true of the copper

ores of a famous mine in Mansfeld, Germany. In Europe, however, the larger part of the silver is obtained from galena ores. There are various silver alloys, including those containing

gold, mercury, and copper.

Production. The richest silver mines on the globe are in the two American continents. Mexico, the United States, and Canada together produce about three-fourths of the world's supply of the metal, Mexico and the United States alternating for first place among all the countries. The other principal silverproducing countries are Peru, Bolivia, and Chile, in South America; Germany and Spain, in Europe; New South Wales, in Australia; and British India and Japan, in Asia.

The leading silver-producing states are Utah, Montana, Idaho, Arizona, Nevada, and Colorado. This order varies from year to year. In Canada, Ontario and British Columbia furnish most of the supply. In the Cobalt area of Ontario, high-grade silver ores carry from 3,000 to 4,000 ounces to the ton.

Related Subjects. The reader is referred to: Metallurgy Lunar Caustic Metals Photography

SILVER AGE. See AGE (Historic Ages). SILVER CERTIFICATES. See MONEY (Paper Money: Silver Certificates).

SILVER CHLORIDE. See SILVER (Uses). SILVER FULMINATE. See SILVER (Uses). SILVER LACE. See GOLD LACE.

SILVER NITRATE. See SILVER (Uses). SILVERSIDES, a salmon (which see).

SIMCOE, John Graves (1752-1806), British patriot, was born at Cotterstock, England. An ardent Loyalist, he served throughout the American Revolution, was the first lieutenantgovernor of Upper Canada, and, for a short time, governor of Santo Domingo. His administration in Canada was marked by far-sighted expansionist plans, road-building, and good government. He was appointed commander-inchief in India but death prevented his filling the

SIME, J. G. See Canadian Literature

(English Canada: Fiction).

SIMILE, sim' il e, a figure of speech in which some resemblance between two objects essentially different is pointed out by means of some definite connective word, usually like or as. This explicit statement of the comparison distinguishes it from the metaphor. "She ran like a deer," and "It was as sudden as lightning," are similes. The so-called Homeric simile is a long, involved comparison.

Similes often become so much a part of everyday speech and thought that the specific word of comparison, *like* or as, is dropped, and the figure becomes a metaphor. Thus, "He is like a fox," becomes "He is a fox". See FIGURE

OF SPEECH; METAPHOR.

SIMLA. See India (The Cities). SIMMONS COLLEGE. See Massachu-

SETTS (Education).

SIMMONS-UNDERWOOD ACT. See TARIFF.

SIMMS, WILLIAM GILMORE (1806-1870), an American novelist and poet, with the ex-

ception of Edgar Allan Poe the most brilliant man of letters produced by the South before the War of Secession. Born in Charleston, S. C. Simms was educated for the law, but never practiced to any extent. His first volume of poems was published in 1827, and the following year he became owner and editor of the Charleston City Gazette. Thereafter, he devoted him-



Photo: Bro

WILLIAM GILMORE SIMMS

self to journalism and literature. He supported the cause of the South earnestly, and lost the greater part of his fortune during the war.

His Writings. For spirited narrative, vivid description, and faithful portrayal of local conditions, nothing excels his border romances of the Southwest—Guy Rivers, Border Beagles, and Beauchampe; his story of Indian warfare in the early days of the Carolinas—Yemassee; or his tales of the Revolutionary War—Mellichampe, The Scout, Woodcraft, and others. The Wigwam and the Cabin contains his best short stories. He also wrote a history of South Carolina, and biographies of eminent Southern men. Among his finest poems are Atalantis: a Story of the Sea; The Swamp Fox; and The Lost Pleiad. The closing lines of the last, which appear below, are often quoted.

The hope most precious is the soonest lost, The flower most sweet is first to feel the frost. Are not all short-lived things the loveliest? And, like the pale star, shooting down the sky, Look they not ever brightest, as they fly From the lone sphere they blest?

SIMON, the Cross-bearer. See Africa (History).

SIMONIDES, si mon' ih deez (556-469 B.C.), a celebrated Greek lyric poet and one of the most accomplished men of antiquity, was born on Ceos island. He excelled in his triumphal odes and elegies. These are characterized by a sweetness, simplicity, pathos, and power of expression which rank him with Pindar, his contemporary and great rival, whom Simonides scandalized because he accepted pay for his writings. See PINDAR.

The young poet was treated with great consideration by Hipparchus. Later, he enjoyed the patronage of powerful families of Thessaly.

After the invasion of Greece by the Persians, he wrote a number of elegies, dirges, and epigrams celebrating the heroes and the battles of that struggle; for his elegy on the soldiers who fell at Marathon, he won the prize over Aeschylus. He won fifty-five other prizes in similar poetical contests. His last years were spent at the court of Hiero of Syracuse.

SIMON PETER. See Apostles (Peter). SIMONS, Menno. See Mennonites.

SIMON THE CANAANITE. See Apostles. SIMOOM, or SIMOON, a hot dry wind common to the Sahara and the Arabian desert, which carries with it great clouds of dust, making the sky hazy. It is one of the terrors of the desert, arriving suddenly and suffocating men and beasts. Travelers have to lie down close to the ground with their heads covered, and the camels burrow their noses into the sand. The simoom may pass in ten minutes, or it may last for hours, even for days, leaving the sand drifted like snow after a blizzard. In March, 1901, there was a great African simoom which scattered red and yellow sand and dust over all of Southern Europe, and it was even reported that sand fell in England. This wind is caused by the overheating of the soil and layers of air next to it. The burning hot air ascends, and cooler currents from all sides flow in, producing a desert whirlwind. R.H.W.

Related Subjects. The reader is referred to the article WIND and to the titles there listed.

SIMPLIFIED SPELLING. See Spelling.

SIMPLON, a pass in the Swiss Alps over which Napoleon built a magnificent road in 1800-1806. The construction of this highway is considered one of the great feats of modern engineering; it is forty-two miles long and between twenty and thirty feet wide, and is carried over 611 bridges. In other places, it runs through huge tunnels. The pass lies near the frontier of Piedmont, Italy, in the eastern part of the canton of Valais. The name is also applied to the largest railway tunnel in the world, built through the Alps at this point between Brieg and Isella. It consists of two single-track bores nearly twelve and one-half miles in length, and was completed in 1906, eight years after work was begun. It has since been electrified. The pass is 6,592 feet above sea level; the highest point of the railway tunnel, about 2,300 feet.

SIMPSON, SIR JAMES YOUNG (1811-1870), a distinguished Scottish physician, the discoverer of the anesthetic qualities of chloroform. He was born at Bathgate and educated at the University of Edinburgh, from which he received the M.D. degree in 1832. In 1840 he became professor of medicine and midwifery in the university, and seven years later was appointed physician to the queen of England. In that same year, he announced his important

discovery; and his advocacy of the use of chloroform in childbirth gave rise for a time to heated discussion. Simpson was also the inventor of a means of arresting loss of blood in hemorrhage. For his great service to his profession, he received various honors, and in 1866 was created a baronet. He was given a public funeral, and a maternity hospital was founded in Edinburgh in his honor. See ANESTHETIC; CHLOROFORM.

SIMS, WILLIAM SOWDEN (1858-1936), an American vice admiral who commanded the American naval forces in European waters

after the United States joined the Allies in the World War. He was born at Port Hope, Canada, but was educated in the United States. He entered the Naval Academy at Annapolis, was graduated in 1880, and then rose steadily in the service, attaining the rank of vice admiral in 1917. In 1918 he was made an admiral, but when he gave up the command of the United The after the war, his per-



VICE ADMIRAL SIMS foremost American States naval forces, naval commander in the World War.

manent title reverted to that of vice admiral. From 1897 to 1900, Sims was naval attaché to the American embassies at Paris and Leningrad (then Saint Petersburg), after which he was inspector of target practice for the Asiatic squadron. In this capacity, he reported to President Roosevelt a new system of target practice for the navy gunners. The President ordered him home, and caused the system to be adopted. He was thus instrumental in vastly improving American gunnery practice in the navv.

Between 1909 and 1911, Sims was commander of the Minnesota, for the next two years was a member of the Naval War College, and in 1913 was appointed to the command of the Atlantic torpedo flotilla. The entrance of America into the European war brought further responsibilities. His promotion to the rank of vice admiral, ordered by President Wilson in 1917, gave him an equal standing with the British and French naval commanders, and during an interval in which the commanding British officer on the coast of Ireland was absent, Admiral Sims held chief command of the allied fleet. In 1921 he published The Victory at Sea. He was accorded many honors for his services, from England, France, Belgium, Japan, and Italy, in addition to honorary doctorates from several universities.

SINAI, si' ni', or si' na i, the mountain, called also in Scripture Horeb, on which Moses received the Law. It is supposed to be one of the three peaks of the mountain range on Sinai Peninsula, which lies between the two arms of the Red Sea-the gulfs of Suez and However, the Mount Sinai men-Akabah. tioned several times in the Bible has not been conclusively located, because of disagreements The Children of in the available records. Israel camped on the plain before Sinai while Moses remained forty days upon the mountain; at the end of this period, he returned with the Ten Commandments, written on tablets of stone (*Exodus* xix-xx). See Moses.

Modern Application. Sinai is often used figuratively in literature to symbolize the legal side of God's dealing with men, as Olivet and Galilee represent the milder aspects of forgiveness and grace.

SINCLAIR, HARRY F. See COOLINGE. Calvin (Teapot Dome Investigation).

SINCLAIR, UPTON [BEALL] (1878-American writer and prominent advocate of socialism, was born at Baltimore, Md. He was graduated from the College of the City of New York in 1897, then spent four years in

postgraduate work at Columbia University. Sinclair became widely known in 1906 as the author of The Jungle, a novel which exposed conditions then existing in the Chicago stockyards. As the result of his agitation, an investigation was ordered by President Roosevelt, and improvement followed. Sinclair is an advocate of coöperative housekeeping,



UPTON SINCLAIR

and he founded a colony on that basis in 1906, near Englewood, N. J. He was one of the founders of the Intercollegiate Society. In 1928, he was considered as a presidential candidate. After joining the Democratic party, he became candidate for the governorship of California in 1934 but was defeated in the election.

His Writings. These include The Money-Changers, The Brass Check, The Story of a Patriot, They Call Me Carpenter, The Goose-step—A Study of American Education, Singing Jailbirds (a drama), Oill, Money Writes, Boston (about the Sacco-Vanzetti trial), Mental Radio, Roman Holiday, The Wet Parade, American Outpost, Upton Sinclair Presents William Fox, and I, Governor of California: and How I Got Licked.

SINDBAD THE SAILOR. See Roc.

SINDIA, OR SINDHIA, the family name of the Mahratta dynasty, which ruled Gwalior, a native state of Central India, until conquered by the English, in 1844. The dynasty was

first known to fame in the early part of the eighteenth century, when Ranoji Sindia, who had risen from the position of a slipper-carrier to the peshwa (prince), was made the commander of the royal bodyguard. When he was sent to collect tribute from the people of the Malwa district, Sindia established headquarters at Ujjain and built up his own dominions, where, after his death in 1745, his descendants continued to reign, until the occupation of the country by England.

The most powerful of these successors was Mahadji Sindia, who, in 1782, executed a treaty with Great Britain by which he secured his capital, Ujjain; the British withdrew to territory in the north and established relations of neutrality. With the view of extending his dominion, and hoping soon to control all of Hindustan, he engaged a military genius capable of organizing his army along the lines of European discipline and tactics. equipped beyond the dreams of other native princes, he subjugated Delhi and Agra, and became dominant in the Hindu states. He died in 1794, and none of his successors was as illustrious as he. Their territory dwindled until finally it was entirely annexed by the British.

SINDING, CHRISTIAN (1856-), a prominent Norwegian composer and teacher. His compositions are interesting because they suggest the spirit of Northern lands and have charm of melody and excellence of construc-At the Leipzig Conservatory, where Sinding studied, he won high honors as a pianist and organist, and later he studied at Dresden, Munich, and Berlin. His principal works include a symphony in D minor, the Rondo Infinito for orchestra, the suite Episodes Chevalaresque, the piano concerto in D flat, and the violin concerto, op. 45. In 1914 his opera *Der heilige Berg* was produced at Dessau. SINDRI, *sin' dre*, leader of the gnomes (which see) in Norse mythology.

SINGAPORE, sing ga pohr', an island and city forming a part of the Straits Settlements, belonging as a colony to Great Britain.

The Island. The island is about twentyseven miles long and fourteen miles wide, and is separated from the southern end of the Malay Peninsula by the Strait of Malacca. Its total area is 225 square miles, and in 1941 it had an estimated population of 769,216 (excluding Labuan Island); most of the people live in the city of Singapore. The population is a cosmopolitan swarm made up of people of many races, religions, and languages, with Asiatic predominating.

The island is hilly and covered with dense tropical shrubbery. The climate is practically uniform the year around, and the high relative humidity makes the heat almost unbearable at times. The soil, though not rich, is very productive, owing to the cultivation and

enterprise of the Chinese, who have extensive vegetable gardens and raise indigo and other tropical plants. Para rubber is a product of prime importance, and is first on the list of exports. For several years, rubber was cultivated to the exclusion of many necessary food products which had to be imported. Famine in some of the neighboring countries seriously menaced the food imports of Singapore, and demonstrated the dependence of the people on the outside world for food necessary to sustain life. However, meat continues to be imported from Australia, canned milk from Switzerland, and vegetables from near-by islands. Tin is the only important metal found on the island, and the annual export of this ore is valued at approximately \$100,000,000. More than half the total tin output of the world passes through the smelters of Singapore.

The City. Singapore, whose name is from the Sanskrit for "Lion City," has developed in the last hundred years from an unknown settlement to a port of world importance. It is the natural gateway through which many oceanic routes must pass, bearing the cargoes between the East and the West. Accounts claiming that it was a trading center seven or eight hundred years ago, and that it was devastated by the Javanese in 1252, cannot be borne out by the historical sources of that period, though some basis for the tradition may yet be uncovered.

Sir Stamford Raffles secured the island from the sultan of Johore for the East India Company in 1819, because he recognized its strategic position and foresaw its importance. At that time, the only inhabitants were a few fishermen, and all governmental control was administered through the East India Company's station in Sumatra. In 1826 it became a part of the colony of the Straits Settlements. It is maintained as a free port, though taxes are imposed on opium, tobacco, spirits, beer, and petroleum, from which sufficient revenue is obtained to make income taxes unnecessary, and to pay Singapore's share of the military defense. The harbor is good, and excellent docking and warehouse facilities are provided.

Singapore is a picturesque city, with a beautiful esplanade on the outer harbor, and numerous handsome buildings, churches, and museums. It has one of the finest botanical gardens in the world, and branches of the Royal Asiatic and other learned societies. The chief industries are tin-smelting and fruitcanning; the exports, listed in order of value, are rubber, tin, copra, pepper, and preserved pineapples. The imports are rubber, tin ore, rice, cotton goods, tobacco, cigars and cigarettes, vegetables, fruit, and sugar.

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Singapore is the capital of the Straits Settlements, and in addition has a separate municipal administrative body appointed by the colonial



A VIEW OF THE WATER FRONT AT SINGAPORE

governor. The city has railway connections with Johore Bahru on the mainland, via the Johore Causeway, and an electric trolley system to Penang. The usual wireless, cable, and postoffice facilities are also available, and steamship communications are maintained; in fact, Singapore is one of the most cosmopolitan ports of the world.

At the beginning of World War I, there were many German civilians in Singapore who were held in an internment camp. only military defense for the city and island was in the hands of a few Indian troops who were not entirely in sympathy with Great Britain, and a mutiny broke out in 1915, in which several Europeans were killed, and officers of the Indian troops shot down by their subordinates. Suspicion was directed to the possible co-operation of the Germans and dissatisfied Indian troops, and evidence seemed to substantiate the suggestion. The uprising was put down by volunteers, while French, Japanese, and Russian ships were sent to prevent a recurrence of like outrages. This experience and others demonstrated to Great Britain the necessity and desirability of a naval base in the Far East.

Hong Kong and Singapore were considered the best possibilities, and each had its advantages. Singapore is 1,440 miles nearer London, while a naval base in Hong Kong might be misinterpreted by China and Japan. In 1921 an appropriation of \$55,000,000 was suggested by the British Imperial Conference for such a naval base. Two years later, at the Washington Naval Conference, England pledged itself not to establish additional fortifications east of 110° longitude, and Hong Kong was thus eliminated. Considerable criticism was made of this project. The Labour party objected on the ground of expense. However, an overwhelming vote in the House of Commons assured the fortifications. A pontoon dock of seven sections was constructed at Newcastle, England. It was completed in 1928, and towed to Singapore. In 1938, a new naval base was opened. The combined establishment included a huge floating drydock, a permanent drydock, antisubmarine steel nets, airfields with hangars, oil reservoirs, searchlights, antiaircraft batteries, and powerful guns. After the conquest of Malaya by the Japanese in January, Singapore also fell on February 15, 1942. The loss of this key naval base had a profound effect on the course of the war. Sumatra, Java, New Guinea, and other East Indian islands were occupied wholly or in part by Japan. Even Australia and New Zealand were threatened. See STRAITS SETTLE-MENTS; WORLD WAR II.

SING A SONG OF SIXPENCE. See RHYMES OF CHILDHOOD.

SINGER, ISAAC. See SEWING MACHINE. SINGHALESE, sin gah leez'. See CEYLON.

SINGING. Musical tones are produced by the same mechanism as speaking tones; that is, the vocal cords are set in vibration by a current of air from the lungs, and these vibrations produce sound. The control of the air column behind the vocal cords is most essential in singing, and it is the development of this control that occupies a great part of a singer's training. The muscles involved in correct breathing, particularly the diaphragm, must be exercised, so that the power of the voice may be easily and smoothly regulated. The quality messa di voce, which means the gradual increasing of a tone from very soft, pianissimo, to the other extreme of fortissimo, and then slowly decreasing the power to the starting point, requires very exact control of the breath and the air volume expelled. The tones of the human voice range over about three octaves, from the bass D to the soprano B flat, though a single voice is not usually capable of more than about two octaves, and the untrained person averages only twelve tones. Exceptions have been found where more than three octaves could be reached.

In singing, one uses many more notes than in talking. In the production of singing tones, the cords undergo considerable tension, or stretching, and the higher one sings, the more tightly the cords are stretched, just as the higher notes on a violin are produced by the tightly stretched strings. Pitch is also determined by the length of the vocal cords. Women have shorter cords than men and their voices are higher-pitched, as the shorter the cord, the higher the pitch. A very long cord gives a deep bass voice, the lowest division of the singing voice. The other divisions, named in order from low to high, are barytone, tenor, alto, mezzo soprano, and soprano.

Other factors in vocal training are purity of tone, delivered with clarity and freedom, and enunciation of vowels and consonants so that the words are intelligible while the tone is kept pure. English vowels and consonants are not as well adapted to singing as Italian, French, or Spanish, because to form English words, the physical apparatus of the voice is held in positions inconsistent with good tone Legato, or smoothness of the formation. voice, requires that there be no break between notes, and is essential in carrying a melody. Training in singing demands patience and practice, and though singers with mediocre voices cannot be developed into opera stars through training alone, there are few persons who cannot be taught to sing at least simple melodies. A pleasing speaking voice is another benefit derived from training.

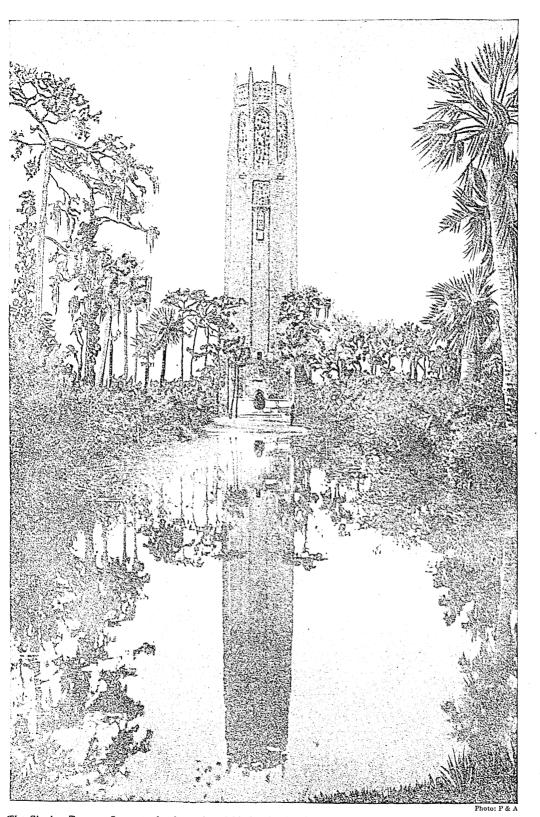
Related Subjects. In connection with this discussion of singing, the reader should consult the following articles in these volumes:

Music Voice (How to Cul-Sound (High Tones and Low) tivate the Voice)

SINGING TOWER, a symbol of beauty offering music, sculpture, architecture, landscape design, and the arts of the workers in brass, iron, ceramics, marble, and stone in a gorgeous symphony. Singing Tower, a gift to the American people from Edward Bok, stands in the midst of a magnificent park of fifty acres at Mountain Lake, Fla., on Iron Mountain, the highest land in the state, halfway between the Gulf of Mexico and the Atlantic Ocean. It was built as a sanctuary of peace for man and for birds, and, in the words of its donor, "to spread the influence and power of beauty, which we so much need in this country, both in our cities and our communities and in our homes. Secondly, to express my appreciation and gratitude to the American people for their kindness and generosity . . . extended without limit."

Acclaimed as the "Taj Mahal of America," and rising from a base of creole marble fifty feet square, the majestic structure of golden Florida stone and salmon-pink Georgia marble soars upward to a height of 205 feet, gradually changing form and tapering to a width at the top of only thirty-seven feet. There is not a continuous vertical line in the building; even the elevator shaft curves ten inches out of the perpendicular. The tower is surrounded by a narrow moat, which spreads into a reflecting pool in front of it. At the northern end of the pool, a beautiful view of the tower is mirrored on the still surface of the water.

Two marble drawbridges, which are never drawn up, cross the moat. Designed by Samuel Yellin to be in scale with the massive base of the tower, the wrought-iron railings of the bridges are unusually heavy. The great, golden door, sole entrance to the tower, a piece of craftsmanship of which Ghiberti would be proud, designed and hammered out of brass by Yellin, shows the six days of Creation recorded in Genesis. On the south base is a huge sundial surrounded by the signs of the zodiac, carved from designs by Lee Lawrie. Just above is a decorative frieze in which flamingos, herons, wolves, and flowers form a graceful pattern. The band is pierced and becomes a balcony on the four fronts. Grilled windows on the east and west elevations are cut from white marble six inches thick at the maximum and thin enough at the edges to be translucent. Milton B. Medary, of Philadelphia, Pa., was the architect, and he was awarded the gold medal of the American Institute of Architects for producing "one of the three great works in this country which are really conceptions and not copies of some existing form of art."



The Singing Tower. In part, the donor found his inspiration for the gift from the injunction of his grand-mother: "Wherever your lives may be cast, make you the world a bit more beautiful and better because you have lived in it."

6620

The name "Singing Tower" was borrowed from the Netherlands, Mr. Bok's native land, where, from medieval times, great towers have been built as vantage points for watchers, that they might warn the people of floods from broken dikes, or the approach of an enemy. At first, a horn was used to give the alarm, and later bells; then clocks were placed in the towers, which struck the hour. More bells and chimes were added, until finally the carillon was developed. These singing towers, as they came to be called, were an integral part of the community life, for they rang out the signals for war, peace, prayer, work, and feast. The sculptural work on the towers depicted the history of the people, and represented the local plant and animal life. In the same way, the sculptural work and the exquisite faïence grilles of the windows and bell chamber of the Singing Tower symbolize the life and legend of Florida.

There are sixty-one bells, with forty-eight tones, one of the largest carillons in the world. The big tenor bell weighs eleven tons; the silver-voiced baby, only sixteen pounds. A jury of three famous musicians went to England to judge the bells for Mr. Bok, and declared them to be the most perfectly tuned carillon they had ever heard. The bells hang on four levels, and are stationary, with the clappers moved

by levers.

In 1923 the site was a rough tangle of undergrowth; in 1928 it was a paradise of king palms, grass-carpeted glades, leafy shrubbery, orange groves, and shining water. Frederick Law Olmsted was the landscape architect, and it was his genius that created a fitting setting for this sanctuary for birds and weary humans, with its motto by John Burroughs, "I come here to find myself: it is so easy to get lost in the world." Thirty varieties of birds are habitually there, and many others come back each year during the migratory season. Scattered about the garden are fifty bird baths, and many kinds of berries have been planted, so that the birds may bathe and find food. Singing Tower was dedicated by President Coolidge in February, 1929. About a year later the Tower became the burial place of Bok. See Bok, Edward.

SINGLE TAX, a method of taxation which would raise all the revenues needed by the government by a single tax on land. As generally used, the term designates the plan formulated by Henry George, an American journalist and economist. George did not originate the doctrine; he did, however, give it its simplest

and most lucid expression.

Theory of the Single Tax. The argument developed by George in his famous book, *Progress and Poverty*, is that the land belongs by right to all the people, and no generation has the right to alienate permanently any portion

In studying economic progress, he arrived at the conclusion that it is marked by increasing extremes of wealth and poverty. This is a result of the tendency of a small part of the community to obtain possession of the land, which is the great natural source of wealth. As long as free land is obtainable. the laborer continues to command a good living wage; but when no such land is obtainable, he is compelled to pay a price for the use of land, and consequently he no longer retains all the wealth he produces by his labor. A considerable portion of it goes to the landlord in the form of rent (which see). Rent, according to the single-tax theory, tends to absorb all values above the minimum wages and interest; this is manifestly unjust and socially undesirable. A few square feet of rocky soil on the point of Manhattan Island (New York City) are worth a fortune, and this value is created by the presence, within a small area, of about 2,000,000 people (the island is only a part of New York City). It is pressure of population that creates excessive land values; consequently, it is to be regarded as a social value, and the community as a whole should share it.

Since they regard the private ownership of land as wrong, single-taxers do not hesitate to urge a tax sufficient to absorb practically the whole of the landlord's share. In their scheme of taxation, he would be left only a sufficient reward to induce him to collect the rent and pay his tax. In fixing this tax, it would be necessary to discriminate between the actual value of the land and that added by improvements. This actual value, created by nature and population, is known to economists as pure rent, and the absorption by society of practically all pure rent is the aim of single tax. This rent would be more than sufficient to defray the expenses of government, and no other form of property would need to be taxed. Such a scheme of taxation would prevent the holding of vacant land for speculative purposes, since taxes so heavy could not be supported by idle land. Land which is now waste could thus be made to add to the total economic output. According to its adherents, the single tax would have the effect of equalizing opportunity in every sphere, and would greatly stimulate production. It would largely do away with extreme wealth and poverty.

Objections to the System. Critics of the system have pointed out that property is a social product, the right to hold which is granted for purposes of expediency. It is safeguarded by contracts, guaranteed by the state. Any such violent disturbance of the delicately adjusted economic and social scheme as confiscation implies would work great hardship and injustice on a considerable part of the community. As to its effect upon industry, it has been urged that to vest real ownership of

the land in the government would be to reduce farmers to the status of tenants and to discourage the tendency to improve the land, which is most certainly stimulated by private ownership. A third criticism is to the effect that revenues derived from land alone would be inelastic and ill adjusted to the actual needs of government. Henry George lost sight of the fact that not all investors profit by the land they purchase, and that the risk they take in acquiring and improving land certainly entitles them to some return. He would have the landowner assume all the losses, and the state confiscate the profits. Land increases in value because of social causes which also may operate in the other direction and cause decreased values. If the state is to share in profits, it should be prepared to bear a part of the losses.

Progress of Single-Tax Movement. Naturally, the single tax can only be the result of a gradual development, step by step. The first step is municipal single tax, which means that the tax on land values is limited by the require-

ments of local government.

Municipal single tax has been introduced in many parts of the world. Progress and Poverty, Henry George's great book, was published in 1879; eleven years later, the legislature of Queensland, Australia, required its municipalities to exempt all personal property and all real-estate improvements from taxation. Since then, many of the local taxing districts of that country have adopted the complete municipal single tax. A modified form of the single tax prevails in New Zealand [see New Zealand (History and Government)].

In Canada, the single tax has made greatest progress in the West, where it has been adopted by many of the larger cities, including Vancouver, Victoria, and Edmonton. In the United States, it is not so common, chiefly because most American cities are not free to

change their systems of taxation.

National Single Tax. Schemes for a national single tax include such a violent readjustment of existing conditions that even its most earnest advocates do not indulge hope. Under such a system there would be no tariffs, no income taxes, no taxes of any kind except on land. As a preliminary to national single tax, there must be universal free trade, and this will certainly not be attained at an early date. Once inaugurated, however, world-wide free trade and single tax, it is claimed, would increase international trade to such proportions that the nations of the world would be bound together into an inseparable brotherhood. The ultimate result of the single tax would be the abolition of war, for mere self-interest would require peace. The most ardent advocates of the single tax believe that it would create a new and higher patriotism in the world.

Related Subjects. The reader is referred in these volumes to the following articles:

Economics George, Henry Rent Tax and Taxes

SINGLE ENTRY. See BOOKKEEPING.

SINGMASTER, ELSIE (1879-American author whose delightfully realistic stories of the "Pennsylvania Dutch" are eagerly read by those who appreciate folksy tales and artistic characterizations. Born at Schuylkill Haven, Pa., the daughter of a Lutheran minister, she was graduated from Radcliffe College in 1907, and five years later married Harold Lewars, who died in 1915. Miss Singmaster has a charming way of creating and presenting her characters, providing them with an original situation, and then allowing them to develop as they will. Her intimate acquaintance with the people of whom she writes offers her rich material for her stories. She has written a number of books for children, several of which are on historical topics.

Her Writings. In addition to numerous magazine articles, her writings include When Sarah Saved the Day; Gettysburg—Stories of the Red Harvest and the Aftermath; Katy Gaumer; Emmeline; Life of Martin Luther; Basil Everman; A Boy at Gettysburg; Bred in the Bone; Book of the United States; Book of the Constitution, and A Little Money Ahead.

SING SING (formerly Mount Pleasant), a famous state prison at Ossining, N. Y. It was erected by convicts, the first draft of whom, from Auburn state prison, began work in 1825. A building for women, since demolished, was erected in 1835. Only male prisoners are now housed at Sing Sing, except in the death house which also receives condemned women. The older buildings of the prison are antiquated, judged by standards of the present day, and are not well adapted to the introduction of prison reform. Regardless of this fact, humane wardens have greatly improved the conditions of prison life. Within recent years, a number of new buildings have been erected, and a general scheme of reconstruction is now under

All the functions of a city are carried on at Sing Sing, with the prisoners chiefly supplying the labor. They repair and maintain the buildings, except major operations which are performed by outside contractors; they conduct the correspondence department, which handles the incoming and outgoing mail of the 2,500 prisoners under the supervision of an officer and civilian censors; produce the light, power, and ice; control traffic and maintain a fire department; make the clothing, shoes, etc.; cook and serve the food; run the farms; keep up the garage, library, school, and morgue; and operate factories which manufacture more than 200 different articles, with an annual value of well over \$1,000,000, all under the careful direction of trained guards,

officers, or civilian executives. Clerical work of a confidential nature and records affecting inmates are handled almost exclusively by civilian employees. Because of the opposition of the trade unions to the competition of prison-made products, a New York law requires that all articles that are manufactured in the prison shall be sold to state, county, or municipal institutions.

The working hours are from 8 A.M. to 4 P.M. Conversation among the prisoners is permitted, except when the occasion demands silence. Occupations for which the prisoners are trained or adapted are assigned to them whenever possible.

L.E.L.

[For illustration of this famous prison, see the article New York, page 4969.]

SINKIANG, sin ki aling, a province in the extreme western part of China, comprising what was originally Chinese Turkestan and all Chinese dependencies lying east of Russian Turkestan, between Mongolia on the north and Tibet on the south. The region as a whole, which covers an area of over 550,000 square miles, more than twice that of Texas, is a vast, barren plateau with mountain barriers on all sides. Along its northern boundary is the long chain known as the Tian-shan Mountains, and the Kuen-lun, Altyn Tagh, and other lofty ranges shut it in on the south. On the east it is penetrated by the desert of Gobi. Much of the natural vegetation borders on that of the Siberian steppes; but where the plateau is drained by the Tarim River and its tributaries, making lines of fertile oases, cereals, fruits, and vegetables are cultivated with the aid of irrigation. Pastoral regions provide wool and hides for commerce, and the mountains yield jade and gold. In the larger towns, silk, carpets, leather goods, and copper ware are manufactured. Trade by means of caravans is carried on extensively between Sinkiang and China.

The inhabitants, estimated at over 2,000,000, are mostly Mohammedans and Chinese. The province is administered by a Chinese governor, though the subordinate officials are Turkomans. The chief towns are Urumchi (Tihwa), the capital, Kashgar, and Yarkand.

Kashgar, kahsh gahr', or Shufu, an ancient city and former capital of old East Turkestan, is in an oasis in the western part of the country, on the Kashgar, a tributary of the Tarim. The old and the new towns make up the city, and the two parts are located on opposite sides of the river at a distance of about five miles from each other. The old town, or Kuhna Shahr, is surrounded by walls of hard clay, now partly in ruins, though once adequate fortifications. The houses are poorly built and little more than huts; however, there remain a few remnants which suggest interesting and glorious former days. The new town, Yangi Shahr, was built in 1838 and is more modern. It, too, has high walls with turrets and bastions, and it is equipped with a ditch which may be flooded from the river, but only under precarious circumstances, for the walls are of mud on sandy foundations, and would, no doubt, give way in the presence of a great amount of water.

The main trade routes from Peking, India, and Russian Turkestan join at Kashgar, and make it an important commercial and trade center.

Yarkand, yahr kahnd' or Soche, an important trade center, lies about 100 miles southeast of Kashgar, on the richest oasis of Sinkiang. The city. surrounded by a wall and a moat, is entered by several gates. The houses are mostly one-story huts, built of clay and stone, and the streets are intersected by canals and aqueducts. Interesting features include Fort Yengisher, Mohammedan colleges, bazars, and mosques. The inhabitants, largely of Turkish stock, number about 60,000. Agriculture and stockraising are carried on in the surrounding region; wheat, rice, barley, beans, melons, grapes, and other fruits are produced on the fertile irrigated soil, and goats, yaks, camels, sheep, and cattle thrive on the extensive pasture lands. The minerals include gold, lead, and precious stones, though little besides gold is mined. In addition to leather goods and saddlery, for which Yarkand is particularly noted, the manufactures include carpets, woolens, silks, linens, cotton, and dyes, which form the chief articles of trade with Northern India. See TURKESTAN.

SINN FEIN, shin fayn, an organization of Irish intellectuals pledged to revive the national language, literature, art, and customs of Ireland, and to establish Ireland as a republic. The society was the outgrowth of other organizations with similar motives, which had been founded in the latter part of the nineteenth century. Arthur Griffith, an Irish politician (1872-1922), was a leader in these movements, and the influence of his forceful pen brought many adherents to the cause. The United Irishman, a weekly newspaper established in 1800, for which he wrote, came to be the official organ of Sinn Fein. Its aim was to persuade Ireland to abandon parliamentary action as a means to self-government, and to build up sentiment for a free Ireland within the country itself. In 1902 these ideas were announced in a meeting at Dublin, the parties of which formed an organization which they called the Society of the Gaels. They designated their policy by the Irish words Sinn Fein, which are translated "Ourselves"; or, less literally, "Stand together." By 1905 the society, too, was known as Sinn Fein.

The members ridiculed the methods of the Nationalists, and declared that Ireland never properly belonged to the United Kingdom. They set out to develop the economic and industrial life of Ireland, to prepare it for independence. They sought to revive Irish culture, and inspire national consciousness by a recital of the glories of Ireland in history. Their number was small for the first few years, but their zeal and sincerity compensated in a measure for that handicap. They were not loath to resort to arms, and in April, 1916, they joined the revolutionary elements, and took part in

TAREGRAPH CAPITATION FOR CERT BY FRAIRCANTAIN IN THINKING ESCUPA SECOND

the futile Easter rebellion. The British executed or imprisoned the leaders of this uprising, but did not succeed in quelling the spirit which

prompted it.

In the Sinn Fein convention of 1917, they demanded a separate nation and voted a republican constitution, electing Eamon De Valera, a Sinn Fein leader of the Easter revolution who had escaped execution but not imprisonment, as their president. They refused to take part in the convention instituted by the British government to study the situation in Ireland and to propose reforms, and they rejected its recommendations. In January, 1919, they issued a declaration of independence, set up a provisional government, and sent delegates to the Versailles Peace Conference. Their delegates were not admitted, but their activities aroused Great Britain to action. Late in 1920, a new Home Rule Bill was drafted, followed by the treaty of December, 1921, which put the Irish Free State on the same basis as Canada, and offered Ulster the alternative of joining the Irish Free State or continuing as a part of Great Britain. Ulster chose the latter. The Sinn Fein leaders, whose ambition was a united and independent Irish republic, were disappointed that Ireland was not entirely separated from Great Britain, and that it was to be divided into two governments. At first they rejected the compromise, and De Valera resigned his presidency. However, others, principally Griffith and Michael Collins, considered it as much as could be hoped for at the time, and accepted the new régime.

During 1922 and early in 1923, De Valera and his followers engaged in guerrilla warfare, in which property was destroyed and many people killed. Michael Collins, one of the most promising leaders in the new Irish Free State, was assassinated in August, 1922. The government dealt severely with the perpetrators of these crimes, and by 1923 De Valera realized that resistance to the new government had not been successful. Therefore he called a halt to further warlike activities. But by no means have the dreams of Sinn Fein for an independent republic been forgotten or dismissed. In 1927 Sinn Fein Republicans elected to the Free State Parliament refused to take the oath of office, which included a phrase promising loyalty to the British sovereign, but they eventually decided that political office was necessary in their program, and they would take the oath as a matter of form, disregarding it later, if circumstances warranted. The Sinn Fein leaders now believe that, by patience and sacrifice, Ireland will become an independent republic in the natural course of events. Though still enthusiastic and active, they have, temporarily at least, laid aside militant methods of accomplishing their purpose. See IRELAND (History); VALERA, EAMON DE.

SINON, a Greek who figured in the story of the Wooden Horse (which see).

SINUS, one of the eight small cavities in the skull, all of which are connected with the nasal passages by small openings or canals. There are four sinuses on each side of the nose. The two frontals are in the forehead just above the nose, and the ethnoids, maxillary sinuses. and sphenoids are in the cheek bones. They also increase the lightness of the head, and consequently make it more manageable. The air cavities of the sinuses act as sounding boards and thus increase the resonance of the voice. Probably they originally functioned in some connection with the olfactory sense. One of the chief functions remaining to them is in assisting in the warming and humidifying of the inspired air. They are lined with mucous membrane, the secretion of which drains through the nose. Since the sinus and nasal membranes are continuous, infection such as a common cold tends to inflame and congest the sinus membranes, and prevents normal drainage, by closing the openings of the cavities. Such conditions give rise to an ailment called sinus trouble or sinusitis, the chief symptoms of which are headaches or pains around the eyes and in the cheeks; dizziness; and running nose. In severe cases, it is necessary to drain the cavities in order to allay the pain. Sinusitis is particularly dangerous as a focus of infection which may spread to other parts of the body. See Cold; Nose. K.A.E.

SIOUAN, soo' an, INDIANS. See Indians, American (Families or Confederacies; Most

Important Tribes).

SIOUX CITY, IA., the second largest city of the state, ranking next to Des Moines; and the county seat of Woodbury County. It is situated on the Missouri River, the western state boundary, at the mouth of the Big Sioux River, 100 miles north of Omaha, 156 miles northwest of Des Moines, and 509 miles west of Chicago. Sioux City ranks among the five leading livestock markets of the world, and is also a large marketing center for agricultural products. Population, 82,364 (Federal census of 1940).

General Description. Sioux City occupies an area of forty-five square miles. There are many beautiful streets lined with well-built homes, and interspersed with beautiful parks, the largest of which, Stone Park, comprises over 800 acres on the banks of the Sioux River. Other parks of special interest are Grandview, Floyd, War Eagle, Sacajawea, and Riverside. Prospect Terrace has a monument on its peak, erected in memory of one of the first prayer meetings to be held in the Northwest. Sioux City is the junction point of Iowa, South Dakota, and Nebraska highways, and parts of these states may be seen from an eminence in Stone Park.

Transportation. Sioux City is served by six trunk lines—the Chicago, Milwaukee, Saint Paul & Pacific, the Chicago & North Western, the Chicago, Saint Paul, Minneapolis & Omaha, the Chicago, Burlington & Quincy, the Great Northern, and the Illinois Central. There is no longer any river traffic in or out from the city. The Missouri River Bridge connects Sioux City with the state of Nebraska.

Industries. Besides its livestock and packing interests, Sioux City is a great grain market and jobbing center. The manufactured products of the city include automotive equipment, building materials, furniture, metal goods, jewelry, leather goods, serums, agricultural implements, brick, and electrical supplies. The city is also one of the largest markets in the world for high-grade honey.

Education. The institutions of higher learning include Morningside College, a Methodist school; Trinity College, a Catholic school for boys; and Briar Cliff College, a Catholic school for girls. There is also a National Business Training School.

History. Sioux City was founded in 1854, when Dr. John K. Cook, who had a contract under the government to survey part of Northwestern Iowa, located a claim and set about laying out the town, which was named from the Sioux tribe of Indians. During its early years, the town was the outfitting place for prospectors going to the Black Hills, and was a government post for expeditions against the Indians. In 1910 the commission form of government was adopted.

C.L., JR.

SIOUX FALLS, S. D. See SOUTH DAKOTA (back of map).

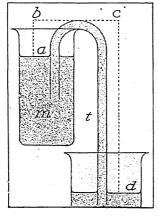
SIOUX FALLS JASPER. See SOUTH DA-KOTA (Mining).

SIOUX STATE, a popular name applied to

North Dakota (which see).

SIPHON, si' falm, a bent tube with two unequal arms, used to carry a liquid from a

higher to a lower level. In the accompanying figure, the liquid (m) is forced through the tube (t) by the pressure of the air on the surface (a), which amounts practically to fifteen pounds to the square inch. As long as the pressure at a is greater than the weight of the column of water $(a \ b)$, or until the the same level, or



(a b), or until the surfaces (d, a) are the same level, or the same level, or a baryonka d the involved appears in the text.

flow will continue. Theoretically, a liquid will not flow through a siphon when the highest point in the tube is thirty-three feet above the level of surface a, because the pressure of a column thirty-three feet high is equal to the pressure of one atmosphere. That is, air will sustain the weight of a column of water thirty-three feet high. In use, however, the height cannot exceed thirty feet, and a better flow is secured if it is not over twenty-six feet.

The siphon principle is used in aqueducts for carrying water over hills, but in such cases the flow is increased by pumps. The so-called siphon bottles for Seltzer water are operated by compressed air or gas.

A.L.F.

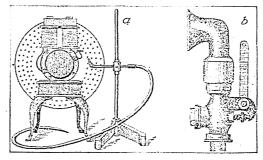
SIPHONAPTERA, si fo nap' tur ah. See INSECT (Classification).

SIPHON RECORDER. See Cable, Sub-MARINE (Instruments).

SIPHUNCLE, si fun k'l. See Nautilus. SIRACUSA, se' rah koo sah. See Syracuse.

SIR DONALD, MOUNT. See SELKIRK MOUNTAINS.

SIREN, an instrument designed originally to measure the number of vibrations in a musical tone of a given pitch. The original form



TWO OF THE SIRENS

The figures a and b are referred to in the text.

of siren consists of a circular disc perforated with one or more circular rows of oblique holes, and so mounted that it revolves close to another disc perforated with corresponding holes sloping in the opposite direction. The stationary disc is connected with a bellows or some other device by which compressed air, gas, or steam is forced through its holes. When the holes in the revolving disc are opposite those in the stationary disc, a puff of air escapes.

As the velocity of rotation increases, the puffs become more frequent until a clear, continuous sound is produced. The more rapid the vibration, the higher the pitch. For instance, if there were thirty perforations in the disc, and it revolved fifteen times per second, there would be 15x30, or 450, puffs or vibrations per second. Thirty revolutions per second would give 900 vibrations, and so on. The revolving disc is connected with a system of clockwork which registers the number of vibrations per second, and by use of a siren of this pattern, the number required for any pitch

sericative control of the second of the seco

a b equals c d, the

can be easily determined (see a in the figure). A more recent pattern makes use of two perforated cylinders, one within the other, in place of the discs. The outer cylinder revolves.

Very large sirens are used for fog signals at lighthouse stations. Steam is employed in place of air, and a large trumpet-shaped horn (b in figure) is used to direct the sound. Some of these fog horns, as they are called, can be heard twenty-five or thirty miles. They produce low tones that carry a long distance. Sirens are also used on city fire trucks and police cars, to clear the way. In many cities in Europe during World War II, sirens sounded the warning for approaching air raids.

A.L.F.

SIRENIA, si re' nih ah, an order of water mammals of which the only living species are the dugongs and manatees. The special characteristics of these mammals are a rounded head, almost hairless, seal-shaped body, absence of hind limbs, forelimbs paddle-shaped and used only as swimming organs, and a compressed tail expanded from side to side. Sirenians live on aquatic plant food, and frequent marshy shores of both fresh and salt waters. They are never seen far out in the ocean, nor do they ever come to shore, though specimens are sometimes cast on land by the tide. Of their origin in past ages and their relation to other mammals, little is known. See Dugong; Manatee.

SIRENS, si' renz, in Greek mythology, sea nymphs who lived on an island, and by their exquisite singing enticed mariners to their shore, where they remained, forgetful of home, of friends, and of duty, until they died of starvation. During his twenty years as a wanderer after the fall of Troy, Ulysses was warned by Circe of the danger from the Sirens, and he stopped the ears of his companions with wax. He himself wished to hear the music, but he had himself strapped to the mast of his vessel, so that he could not yield to the charm if he wished to. See Ulysses; Troy; Odyssey (The Story); illustration, page 4111.

Story); illustration, page 4111.
SIR GALAHAD. See GALAHAD, SIR; HOLY GRAIL.

SIRIUS, seer' in us, THE DOG STAR, the brightest star in the heavens and one of those nearest to the earth (see Centaurus). It is still so distant, however, that its light takes nine years to reach the earth. A line drawn eastward through Orion's belt points at the Dog Star, the head of Canis Major (see illusstration under Astronomy, The Heavens in Autumn and Winter). It is a star of first magnitude, and radiates twenty-six times as much light as the sun. A companion star to Sirius was discovered in 1862, accounting for the previously observed motion of Sirius in a small orbit.

The companion of Sirius is one of the most remarkable objects ever discovered, having the

hitherto unheard-of density of 50,000 times that of water. A cubic foot of such material would weigh about 1,500 tons.

This unique property of this star has led to another very important verification of Einstein's Theory of Relativity (which see), by producing shifts in the spectral lines of the light emitted from the star, so large as to be readily measured. The unparalleled density of the star is supposed to be due to the stripping of electrons from its atoms (see Chemistry, for explanation).

SIROCCO, sih rok' o, the Italian name originally given to two distinct types of southeast winds, common to countries bordering the Mediterranean on the north. Both winds are warm because they come from warm regions, but one is a damp wind that usually heralds rain, while the other is dry and laden with dust from the Sahara, far to the south. When this type of sirocco blows, the sky is dark with fine sand which burns the skin and parches the throat. It is the scourge of Sicily, and is similar to, though less violent than, the simoom of the desert. The term sirocco is now applied to certain other unseasonably warm winds in other parts of the world.

Related Subjects. The reader is directed to the article Wind and to its list of related articles.

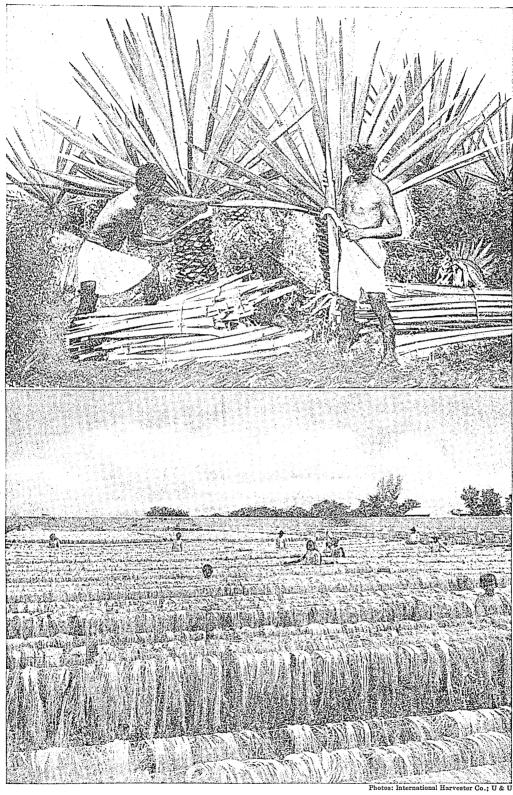
SISAL, se sahl', or si' sal, also known as SISAL HEMP, is a tropical plant whose long, swordlike leaves yield a valuable fiber. There are several different plants that are the source of fiber bearing the name sisal, but the one of greatest commercial importance is Agave sisalana, found originally in the peninsula of Yuca-Though still cultivated there for domestic use, the plant is raised for the trade on large plantations in several of the British colonies of Africa, in India, in the East and West Indies, and in the Philippines. Bulbils from plants naturalized on the Florida Keys are extensively used in propagating sisal. The process of fibergathering begins with cutting the leaves at the base and removing the spine from the top. They are then fed to machines which strip off the pulp and clean the fiber, which is a yellowwhite color, strong and lustrous. The leaves yield less than four per cent of their weight in fiber, and it takes about 1,000 leaves to produce fifty pounds. Sisal is used chiefly for twine and rope. It should not be confused with henequen, which is often called sisal hemp. See Twine; Yucatan; pages 6627, 6628.

SISERA, sis' ur ah, a Canaanite who fought the Israelites at Mount Tabor (Judges IV). See TABOR, MOUNT.

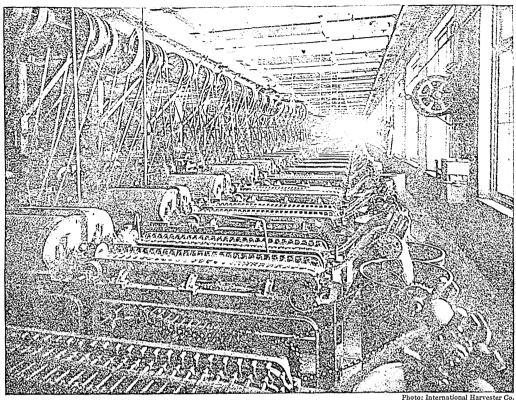
SISKIYOU, sis' ke yoo, MOUNTAINS. See OREGON (The Land).

SISTERS OF CHARITY. See CHARITY, SISTERS OF

SISTERS OF MERCY. See MERCY, SISTERS OF



The Beginning of a Ball of Twine. Above, Yucatan natives cutting and bundling sisal leaves for transportation to factory, where machines separate pulp and fiber. Below, the creamy-white, valuable fiber is spread on wires to be dried in the sun. (See, also, illustration on page 6628.) 6627



6628

CONVERTING SISAL INTO TWINE A battery of spinning machines in an American factory. (See Sisal, page 6626.)

SISTINE, sis' teen, CHAPEL. See VATICAN. SISTINE MADONNA. See MADONNA AND

HER BABE: RAPHAEL SANTI.

SISYPHUS, sis' ih fus, a mythical king of Corinth, in ancient Greece. He was one of the most crafty of men, and his schemes puzzled even the gods. He even outwitted Death, and bound him in fetters, so that there was great rejoicing all over the earth, for no man died. Ares, known to the Romans as Mars, set Death at liberty, and Sisyphus was given into the hands of Death. With his dying breath, Sisyphus begged his wife not to perform the customary rites and sacrifices for the dead, and when he had gone to Hades, he complained to Pluto of the mistreatment, and begged permission to go back to earth and punish his wife for her neglect. Pluto consented, and as soon as Sisyphus was again in his own house, he refused to return. Hermes, or Mercury, however, led him back, and when Pluto had him once more in Hades, he condemned him thereafter to the task of rolling a large stone up a high hill; but just as he would seem to gain his purpose, some unknown force would send the stone to the foot of the hill, and Sisyphus had to begin again.

SIT-DOWN STRIKE. See STRIKE.

SITKA, ALASKA, a town described in the article on that territory.

SITKA MONUMENT. See MONUMENTS, NATIONAL.

SITTING BULL (1837-1890), an American Indian chief, born somewhere in the territory now comprising North and South Dakota. His childhood name was JUMPING BADGER, but when, in his fourteenth year, he killed and scalped his first victim, his father, whose name was Sitting Bull, alias Four Horns, had a feast in his honor, and declared that the youth had demonstrated his right to bear his father's name; thenceforth he was known as Sitting Bull. As a prominent chief of the Sioux Indians, he led his tribes in numerous raids during the War of Secession, and though driven out of his territory, was not subdued until 1866. In that year, he pretended to accept peace, but in reality he later secretly led many attacks on settlements. General George A. Custer (which see), with a picked force of cavalrymen, was sent against him, but in June, 1876, Sitting Bull and his tribe massacred the whole company, on the Little Big Horn River, in what is now Montana.

The chief then fled to Canada, but was allowed to return in 1881. After awhile, he be-

gan to incite rebellion among the redmen, and in 1890, when the Indians were excited over the report of a Messiah coming among them,

he aroused so much hatred among the warriors that the gov-ernment ordered his arrest. While resisting this order, on December 15, 1890, he was killed by the Indian police. He was a natural enemy of the whites, and his entire career was one of secret or open murder. He was highly respected among his people, however, and always remained true to his Indian ideals.

SIVA, se'vah, is the third name in the Hindu trinity, Brahma, Vishnu, Siva. Siva was originally the god



SITTING BULL

of storms and destructive forces. This function is now personified in his consort, the goddess Kali. She is thought of as the forces of physical nature which bring life, death, and after death, life. She is Siva's Power or Shakti, the feminine principle in nature, and is worshipped by millions of Hindus. Siva means kind, gracious. Though he destroys he restores, that men may live again. He is often pictured as the ascetic who looks through the transitoriness of physical life into eternal truth. And because he has destroyed selfishness he has become the god of happiness and dancing, and that freedom and joy which make creative Thoughtful Hindus see him as an divine life. To the simple-minded artists. aspect of divine life. people he is just another god. See BRAHMA; Brahmanism; Vishnu.

SIWA, se' wah, an ancient oasis in the Libyan Desert. See Oasis.

SIX HUNDRED SIX. See ARSENIC. SIX NATIONS. See INDIANS, AMERICAN (Families or Confederacies: Five Nations).

SIXPENCE, a standard coin in Great Britain. It is silver and worth about twelve cents.

SIX PER CENT METHOD. See INTEREST. SIXTE, sikst, a term in fencing (which see). SIXTUS, the name of five popes of the Roman Catholic Church, of whom the most important were Sixtus IV and Sixtus V.

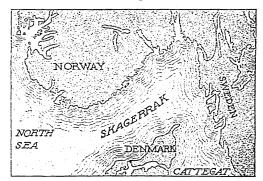
Sixtus IV, born Francesco della Rovere in 1414, was of humble family, but by his undoubted ability won promotion in his Franciscan order and in the Church until 1467 when he was made a cardinal. He continued his philosophical publications until he was elected pope on the death of Paul II, in 1470. His most famous memorial is the Sistine Chapel. A

promoter of the Vatican Library and of scholarship in general, he did much for the general improvement of Rome. His projected crusade against the Turks failed as did his efforts to reconcile the Russian Church with Rome. Nepotism was his vice, and intrigues in Italian statecraft his failure. In 1484, he died.

Sixtus V, Pope from 1585 to 1590, was a member of the Dominican brotherhood. He was born in 1521, of humble parentage, and he himself was once a swine herder. Becoming a famed preacher, he was created bishop in 1566 and in 1570, cardinal. Even in the latter high office, he was little known to the public. and there was much doubt at his election as pope, i i 1585, as to what policies he would pursue. From the first he showed great vigor, firmness, and zeal for reform, directing his efforts especially against the bands of robbers and outlaws who infested the country about Rome. So effectively did he deal with these that his name still remains the synonym for speedy justice against wrongdoers. He strove to advance the cause of the Church as against the newly risen Protestantism, but reproved Philip II for the excesses of the Inquisition. It was he who blessed the Spanish Armada when it went to its destruction in the campaign against England. He was a builder of churches and colleges, the Lateran Palace, and the Vatican Library. Sixtus made a number of administrative changes within the Church; fixed the membership in the College of Cardinals at seventy; and reorganized the congregations and increased their number. Though he did not have the sympathy of the people of his time, his achievements have won him rank with the greatest of the popes.

See also Pope; Vatican City; Vatican (for discussion and illustrations of Vatican Library.) SIZING, coarse middlings. See Flour.

SKAGERRAK, sgahg' ur rahk, commonly skag' ur ak, and also spelled Skager-Rak and SKAGERRACK. The Skagerrak is a broad arm



LOCATION MAP

Skagerrak is shown with respect to Norway, Sweden, Denmark, and the Cattegat.

of the North Sea, which divides Norway and Sweden at the extreme south and separates those two countries from Jutland on the south. It is 130 miles in length, and is the connecting link between the North Sea and the Cattegat, the two forming the entrance into the Baltic Sea. Along the shores of Jutland there is no secure anchorage, for the coast is lined with dangerous sand banks, but along Norway,

eighty miles away, there are several good harbors, the water being over 2,000 feet deep. SKAGIT, skag' ii, RIVER. See WASHING-

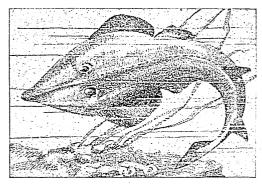
TON (state).

SKALDS, or SCALDS, skawldz, among the Scandinavian races, the name given to the poets who in a measure corresponded to the bards of Great Britain. They lived at the court of some prince, and sang the praises of living heroes and warriors, or exalted the ancestors of their patron. The folk poets who composed roughly and without rules were not reckoned among the skalds, who had to be well educated and versed in all the forms and traditions of Norse poetry. Skalds flourished in Norway as early as the ninth century, and the latest ones lived in the latter half of the thirteenth.

Related Subjects. The reader is referred in these volumes to the following articles:

Edda Minstrel Norway (Language and Literature)

SKATE, the name of certain flat-bodied fish. A typical skate has a pointed snout, expanded pectoral fins which form with the body a



A SKATE

rounded disk, and a slender tail that has lost its function of locomotion and is used only as a rudder. Skates are usually found on sandy bottoms not far from shore. They feed on mollusks, crustaceans, and fishes. Most species are edible. The common, or summer, skate of the Atlantic coast of North America is a foot or two in length. The barn-door skate is larger, reaching four feet in length, and there is a species off the California coast that sometimes grows to be six feet long. The egg cases of the fish are sometimes picked up on shore. They are popularly called "mermaids' purses." A deep-sea skate has been discovered near the Faroe Islands, in the North Atlantic.

Scientific Names. The common skate is Raja erinacea; the barn-door is R. laevis, and the California is R. binoculata.

SKATES AND SKATING. The sport of skating dates back to primitive days, when the skater bound a bone to his foot and used a

staff to aid him in sliding over the ice. A modern skate is a steel blade affixed to a wooden or metal base. It is fastened to the shoe by means of straps, clamps, or screws. The blade may be constructed for special purposes, as for straightaway speeding, for figure or fancy skating, and for ice hockey. The light, long, all-metal blade, which is a development of the club skate, is especially adapted to speed, while the rocker-shape blade is particularly desirable for fancy skating. Perhaps the best-known and most popular for general sport is the Norwegian skate, which has a long, light blade fastened permanently to a specially built skating shoe. The hockey skate, which is also very popular, has a shorter, thicker blade, and is likewise screwed permanently to the shoe. The substitution of wheels for the blade has resulted in the roller skate, which does not require ice, but can be used on any smooth, solid surface.

For centuries, skating has been a popular sport among people of Northern countries. It was earliest developed by the Norsemen, Swedes, Danes, Finns, and Dutch. The great antiquity of the sport is shown by its mention in the earliest Scandinavian literature. During the past century, races and matches have become common in Europe and North America. National associations foster the sport, and arrange for national and international contests. As one of the most healthful and invigorating of sports, skating is attracting more enthusiasts

every year.

SKEAT, skeet, Walter William (1835-1012), an English scholar and philologist, whose edition of Chaucer is universally recognized as standard. He shares with Frederick Furnivall the distinction of being chiefly responsible for the revival of England's interest in its early literature. Born in London, he received his schooling at King's College and Highgate Grammar schools, and Christ's College, Cambridge. He became a fellow of Christ's College in 1860, and in 1878 was elected professor of Anglo-Saxon; his most important work, however, was as scholar and editor, not as teacher. His researches in philology, especially Anglo-Saxon and Middle English, gave him an eminence which became more marked on the publication of his editions of Chaucer's works and of Langland's Piers Plowman. Of his many other works, the most important is the Etymological English Dictionary, the most comprehensive and authoritative book in its field.

SKEE. See Ski.

SKEENA RIVER, one of the many short streams which flow westward across British Columbia into the Pacific Ocean. Its course is about 335 miles long, and its drainage basin covers an area of 19,300 square miles. Though not a large river, it is economically of great importance, for it is one of the greatest fishing

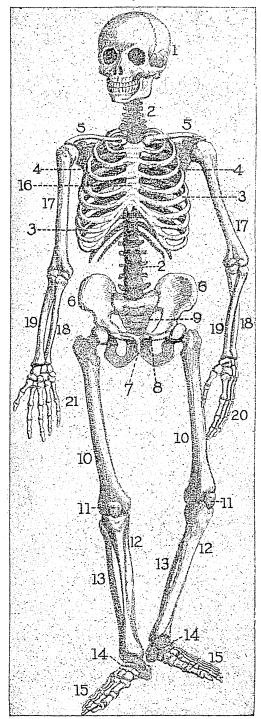
grounds in the world for salmon, and, with the exception of the Fraser River fisheries, is the most valuable in British Columbia.

The Skeena rises in the north-central part of British Columbia, and at one point in its upper course is less than twenty miles from the headwaters of the Finlay, the principal tributary of the Peace River. It flows in a general southwesterly direction, cuts a path across the Coast Range, and empties into the sea about ten miles south of the city of Prince Rupert.

SKELETON. The bones of all vertebrate animals are joined together to form a symmetrical, flexible core which gives shape to the body, constitutes a protecting framework for the vital organs, and serves as a source of attachment for muscles and as a system of levers for muscular action. In man, the highest of the vertebrate creatures, this bony core, or skeleton, is a marvelous example of adaptation to human needs. There are about 200 separate bones in the skeleton (see accompanying diagram), all nicely fitted together and held in place by strong bands of flexible tissue. These bones are grouped into two main divisions, the axial and the appendicular skeletons.

Axial Skeleton. This is made up of the bones of the head, neck, and trunk. Its nucleus is the spine (also called spinal column and backbone), which forms an axis for the support of the other parts of the body. In the upper portion are twenty-four separate bones called vertebrae, seven of which (cervical) are in the neck, twelve (dorsal) in the region of the chest, and five (lumbar) in the loins. To the dorsal vertebrae are attached the ribs, there being twelve on each side. The upper ribs are fastened in front to the breastbone, or sternum. Below the last lumbar vertebra is the sacrum, which consists of five separate bones in infancy, but of one solid structure in adulthood. At the tip of the spinal column is the coccyx, also a single bone in maturity, but consisting of four bones in early life. The sacrum and coccyx are regarded as continuations of the vertebral column. This central axis is one of the most marvelous structures of the body, for it possesses just the right combination of rigidity, flexibility, and elasticity.

Appendicular Skeleton. The parts of the appendicular skeleton are attached to the central axis in such a way as to afford great freedom and variety of movement. This portion of the framework consists of the arm bones and the shoulder girdle (pectoral arch) and the leg bones and hip bones (pelvic arch). The pectoral arch is formed by the collar bones and



PRINCIPAL BONES OF THE SKELETON

- 1. Cranium
- Vertebrae 2.
- Ribs
- Scapula or shoulder blade
- Clavicle or collar bone
- Hip bone Coccyx
- Pubis
- Sacrum
- 11. Patella or kneecap
- Tibia 12.
- Fibula 13.
- Metatarsal bones 14.
- Phalanges
- 16. Sternum
- Humerus
- 17. 18. Ulna
- Radius IQ.
- Phalanges
- 1c. Femur or thigh bone 21. Metacarpal bones

shoulder blades; the hip bones, or pelvic arch, by a single structure called the os innominatum (bone without a name). As may be seen by the diagram, the collar bone on each side is attached to the shoulder blade and also to the breastbone, while the bones of the lower limbs join the pelvic arch in the hip joints. The pelvic arch in turn is attached to the lower part of the backbone. Thus all parts of the framework are joined together, and each part has its work in the body mechanism.

Related Subjects. The various parts of the skeleton and related topics are discussed under the following headings:

Hand Head Bone Cartilage Joints Ligament Face Pelvis Foot

The bones of the arm, foot, hand, and head are illustrated and named under those headings.

SKELTON, JOHN. See POET LAUREATE. SKENE, skeen, Loch. See Scotland (Rivers and Lakes).

SKEPTICISM. See Philosophy (Greek Philosophy).

SKEWBACK, sku' bak. See ARCH; BRIDGE

(Arch Bridges)

SKI, or SKEE, ske, a Norwegian name for wooden runners from three to five inches broad and from five to ten feet in length, used by



A SKIER TAKING A LEAP

men, women, and children of Northern countries for walking over snow and for coasting down snow-covered hills. The ski is attached

Photographed in Sweden.

to the feet by means of straps which allow the heel to rise and fall as in walking, but keep the toes firmly fixed to the wood. Steering is done by means of a staff.

Skiing as a sport is extremely healthful exercise, and has within recent years spread in popularity throughout countries where snow is plentiful. Numerous skiing clubs have been organized, and a widespread interest in skiing tournaments has resulted. In Great Britain, Switzerland, the United States, and Canada, as well as in their place of origin, Norway and Sweden, national ski-championship tournaments are held every year, and are governed by the rules of the International Federation of Ski. In general, the rules pertain to the position, style, and grace of the contestant, the distance of the jump, and the success in avoiding falls. The events of the contests include long and short runs and feats of jumping. The jumping usually attracts the greatest interest and attention of the spectators. When a hillside is used, a take-off halfway down the hill is constructed, so that the skier is hurled into the air and reaches the ground far down the hill. Whenever a natural hillside cannot be used, a high, wooden slide is erected. Staffs are not allowed in ski-jumping. In forest lands, skis are not as useful as the ordinary snowshoe, but in open country they possess great advantages, especially in speed.

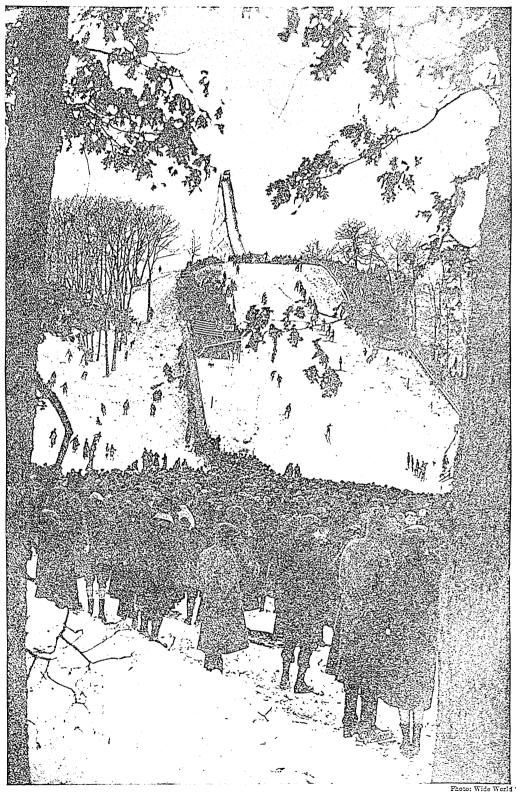
The infantry soldiers of Sweden and Norway are equipped with skis, and accomplish very long marches. White-clad ski troops were used by both Finland and Russia in the 1940 conflict.

SKIDDING (by automobiles). See CEN-TRIPETAL FORCE.

SKIMMER. See Scissorbill.

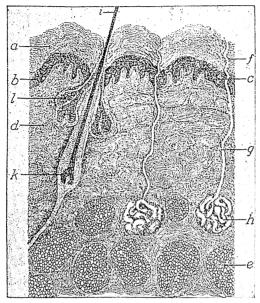
SKIN. We usually think of the skin as that part of the body-covering which we can touch and see. As a matter of fact, the top skin is only a thick, protecting layer which covers what is known as the true skin, or dermis. Dermis is derived from the Greek word for skin, and is compounded with epi, meaning over, to form the word epidermis. The latter is the name for the upper layer, which is also called *cuticle*. An examination of the accompanying diagram will show the structure of the skin layers.

The Epidermis. The top layer is made up of countless cells placed side by side like the paving stones in a street, but instead of one compact row, there are perhaps twelve or fifteen rows, arranged one above the other. These cells grow from the bottom up. In the lowest row, they are column-like in shape, and their long axes are perpendicular to the cells of the under skin. Above are several rows of roundish cells, which grow flatter and flatter as the surface is approached. They also become drier as they are pushed upward by new cells below, and when the surface is reached, they are shed off in thin flakes. This is the "dead skin" one



Scene at Annual Tournament. The meeting of the Norge Ski Club at Cary, Illinois, northwest of Chicago, in January of each year, is one of the principal skiing events in America. Fully 25,000 spectators are usually present.

rubs off with the towel in bathing. In the deeper cells of the epidermis are found nerves, but there are no blood vessels in this layer. That is why a man can pass the razor over his face without discomfort. A cut which draws



CROSS SECTION OF THE SKIN (Greatly magnified.)

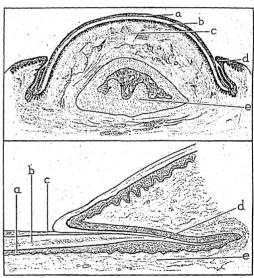
(a) Scarf skin, or dead epidermis;
(b) growing layer of epidermis;
(c) layer of cells filled with coloring matter;
(d) true skin;
(e) fatty tissue;
(f g h) sweat gland and duct;
(i k) hair with follicle and papilla;
(l) sebaceous gland.

blood must be deep enough to reach the dermis. In the deeper layers is also found the pigment which gives color to the skin. Dark races have an abundance of pigment, and white races little or none. It sometimes happens that exposure to the sun causes an increase of coloring matter in spots; freckles are partly the result of such exposure. Hair and nails are parts of the epidermis that have been excessively developed for special purposes.

The Dermis consists of a closely woven network of connective tissue, from one-sixteenth to one-eighth of an inch thick, within which are embedded blood vessels, lymphatics, nerves, glands, and hair follicles. In its lowest part the dermis passes gradually into a loose network of fibers called areolar subcutaneous tissue, which allows the skin to move freely upon the parts below. On the outer surface of the dermis are innumerable elevations about one twohundredth of an inch in length, called papillae (from the Latin word for pimple). The papillae fit into tiny pits on the under surface of the epidermis, so that the two layers are firmly molded together. In the papillae are found the nerves that give the sensation of touch, and they are especially well developed in the inside

of the hands, where they are arranged in rows. The fine ridges on the balls of the fingers and thumb—unalterable identification marks show where the epidermis falls in between adjacent rows of papillae. When a small group of papillae becomes overdeveloped and projects above the surface of the epidermis, a wart forms. People become wrinkled when the fat and other soft parts beneath the dermis are absorbed and the skin does not shrink at the same rate. Building up fat is therefore the proper way to keep the skin smooth.

The Glands. These are among the most important organs of the skin. There are two kinds, those that pour out sweat, or perspiration, and those that discharge oil. The sweat glands are minute tubes that extend from the surface of the body down to the subcutaneous There are over two million of them, distributed over the surface of the entire body, but most abundantly on the palms, the soles, and the forehead. By means of these glands the skin performs a twofold function: it excretes waste matter, and also regulates the heat of the body, for the sweat, as it evaporates, cools off the surface. The oil (sebaceous) glands,



NAIL GROWTH

Upper illustration: (a) Horny part of nail; (b) deeper part of the horny substance (stratum mucosum); (c) part of the horry substance (stratum industum), (e) terminal phalanx. Lower: (a) thickened layer at base of nail (eponychium); (b) horny part of nail; (c) stratum mucosum (see above); (d) root of nail; (e) nail matrix.

which generally open into hair follicles, secrete an oily substance that keeps the hair smooth and glossy and prevents the skin from becoming too dry. So-called blackheads form when the tiny openings of the face oil glands become filled with dirt.

Care of the Skin. The skin must be washed frequently to keep the glands in good working



order. Neglect in this matter will cause the pores (the mouths of the glands) to become clogged. A fresh, rosy complexion is always an indication of health and cleanliness, while pimples and other unsightly blemishes usually tell a story of unhygienic living. Tight clothing and indulgence in rich foods and unwholesome stimulants are hard on the complexion. A sensible régime in regard to food, ventilation, dress, and bathing is of far more value than the practice of using cosmetics. In regard to bathing, one should exercise moderation in the matter of hot water and soap, for if these are used too lavishly, the skin is liable to become dry and scaly.

Skin-Grafting is the transference of living skin to an area made raw by a burn or unhealed sore or ulcer. There are several methods employed; the most common consists in placing superficial layers of skin on the wound. Sometimes, however, the entire thickness of skin, including subcutaneous fat, is laid on the sore spot. If the operation is successful, the new graft causes the wound to heal. Skin-grafting has often been the means of saving life, and it has sometimes been made possible only through the heroism of a person willing to contribute a portion of healthy skin.

Related Subjects. The following articles in these volumes present various phases of the subject. Among them are articles on skin diseases:

Baths and Bathing Boil Dandruff Eczema Erysipelas Glands

Hygiene (Personal Hygiene) Ttch Nails Nervous System Perspiration

SKINNER, OTIS (1858-1942), an American actor known for his fine impersonations of romantic rôles. His ability to blend humor, sentiment, and buoyancy made him an established star on the American stage, and his art had a finish that could come only from thorough training and long experience. Skinner, in fact, had the best of teachers, for he worked with Edwin Booth and Lawrence Barrett when they were at the height of their successful careers, and for five years (1884-1889) he played with Augustin Daly's company. Skinner was born

at Cambridge, Mass. He made his first appearance as a professional actor in 1877, in Philadelphia, and played for two years in that city with the Walnut Street Theater Stock Company. After leaving the Daly or-

ganization, he was leading man for Madame Modjeska through several seasons.

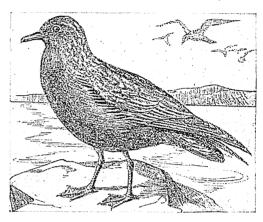
His Greatest Successes. Probably Kismet, a play of the romantic type, was his favorite play; he also won praise for his work in Cock of the Walk, a character comedy by Henry Arthur Jones, and in Booth Tarkington's Mr. Antonio. Other starring productions

include At the Villa Rose, Blood and Sand, Sancho Panza, A Hundred Years Old (in which he played at the age of seventy-one), and The Merchant of Venice.

SKIPJACK. See Click Beetle.

SKITTLES, the Dutch game which Rip Van Winkle encountered in the mountains. See BOWLING; RIP VAN WINKLE.

SKUA, the bird of prey of the ocean, a fierce, gull-like creature with a strong, hooked beak and brown and white plumage. Skuas are found in Arctic and Antarctic waters, where



THE SKUA

they pursue gulls and terns, taking from them the fish they have caught. They also devour smaller birds and their eggs. Skuas build their nests of sticks and grasses on the ground or bare rocks. The eggs are two in number, olivecolored, with spots of brown or chocolate. The birds are artful in concealing their nests, and fight savagely if they are discovered. See GULLS.

Scientific Name. Skuas belong to the family Stercorariidae. The great skua of the North Atlantic is Megalestris skua.

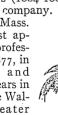
SKULD, shoold, in Norse mythology. See Norns

SKULL. See the article HEAD.

SKULL AND CROSSBONES. See Symbol.

SKUNK, a common member of the weasel family, native to North America. It is closely related to the European polecat (which see). The skunk is dis-

tinguished by its peculiar means of defense, a pair of glands containing a fluid of strong, offensive odor that is ejected with considerable force when the animal is frightened. It is stockily built, about the size of a large cat, with a long, pointed nose and an arched back, short legs, and a mincing gait. The fur, which is long,







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thick, and shiny, is black, marked with prominent white stripes down the back and a white patch on the forehead. The long, bushy tail is black on top and white underneath. The skunk lives in a hollow tree, a burrow, or under sheds, and feeds upon insects, mice, gophers, reptiles, squirrels, eggs, and poultry. Though it makes its raids on the poultry yard at night, and often does considerable damage, it is really beneficial to the farmer, because it destroys forms of animal life that prey on agricultural products. Nine species of skunk are found in Canada and the United States.

The skunk is one of the most valuable furproducing animals in North America. Skunk farms are maintained in Canada and some other localities and are proving profitable. The pelts were formerly marketed as black marten or Alaska sable, but the tendency now is to sell them under the real name (see WEASEL; FUR AND FUR TRADE).

Scientific Names. Skunks belong to the family Mustelidae. The common skunks of Eastern North America are Mephitis mephitis and M. putida. skunk of the Northwest is M. hudsonica. In the Southwest are small skunks of the genus Spilogale.

SKUNK RIVER. See Iowa (Rivers and Lakes).

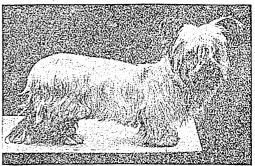
SKY, a term applied to the apparent arch or vault of the heavens, that infinity of space surrounding the earth, the lower portions of which are the regions of winds, rain, and clouds. Omar Khayyam, the Persian poet and philosopher, writes of the "huge, inverted bowl" which we mortals call the sky. In astronomy it is commonly thought of as the visible half of the celestial sphere.

The word is generally supposed to be of Anglo-Saxon origin, and in ancient literature is variously written skewes, skye, skiwes, and skie. In fair weather, the sky is a clear blue color, because the tiny particles of dust in the upper atmosphere reflect the blue waves of light and absorb the other colors (see Color). It is customary to speak of a dull or clouded sky; in reality, it is not the sky that is dull or clouded, but the obscurity is caused by clouds that have come between earth and sky. The word firmament is sometimes used with reference to the sky, as in Psalm xix, 1: "The firmament sheweth his handywork." F.B.L.

Figurative Use. Poetry and literature of all ages contain many allusions to the sky, for it has always exercised an irresistible attraction. The expression, "laud him to the skies," is familiar, and is a synonym for extravagant praise. "A bolt from a clear sky" has long meant some event as unexpected as a lightning flash from cloudless heavens. The word is also used as a verb when applied to art exhibitions. "To sky" a picture means to place it so high up on the wall that it cannot be seen plainly by people on the

SKYE, ISLAND OF. See HEBRIDES.

SKYE TERRIER, one of the smallest of the terriers, native to the island of Skye (see HEBRIDES), and often kept as a house pet. It is a long-bodied, short-legged dog, from eight to ten inches high, and about twenty-two inches long. Its coat is double, with an under layer of soft, short hair, and an outer one with long, stiff, and straight hair. A black muzzle, rather long head and neck, erect or hanging ears, and a tail carried no higher than the back, characterize this little animal, which may vary in color from sandy or mottled bluish-gray to black. There are two varieties, based upon



SKYE TERRIER

carriage of the ears: prick or upright, which is more common and suggests the butterfly ear; and the pendent or hanging ear. Skye terriers are good rat hunters. See Dog; Terrier. w.J.

SKYLARK. See LARK.

SKYLIGHT MOUNTAIN. See Adiron-DACK MOUNTAINS.

SKYROCKET. See ROCKET.

SKYSCRAPERS. See illustrations under ARCHITECTURE; CHICAGO; NEW YORK CITY.

SLAG, a stonelike compound formed in the process of extracting metals from their ores. It contains silica, alumina, lime, and various earthy substances, together with a small quantity of the metal from the reduction of which it results. In the improved methods of smelting, little of the ore remains in the slag, but formerly much ore was thus wasted, and slags could often be smelted with profit. Various economical uses have been found for this byproduct. When reduced to powder, it is used in making mortar, and the phosphorus in it makes a good fertilizer. It is also cast into blocks which are used for roadbeds. iron slag an imperfect glass is manufactured, from which vases and various small articles are made. Melted slag is used to impart a glaze to bricks, and it is used largely in cementmaking. See CEMENT, for diagram.

SLAM (in cards). See Bridge.

SLANDER, a story maliciously spoken with the intention of injuring, or tending to injure, the reputation or good name of another.



Written or printed defamation of character is libel. See LIBEL, for more complete description.

SLANG, a mode of language which departs from the standard or accepted meanings of words and phrases, and gives them arbitrary implications which are novel, vivid, grotesque, expressive, and sometimes vulgar. Originally, the term meant the cant of thieves, beggars, and tramps, who use a special jargon to keep others from knowing what they mean. Thus, unless their turns of speech are explained, the uninitiated are not expected to know that a "moll-buzzer" means one who steals from women. Indeed, the argot of thieves in one locality is often meaningless to those of another. Slang today has a wider scope, and refers to the words and expressions outside the conventional vocabulary which are in popular use because they are apt and the vogue, and not because the speaker desires to conceal his meaning. All classes use slang, though, perhaps, the uneducated use it in a greater degree, for the reason that they do not have more dignified words at their command to express their meaning. Educated people use slang terms not vulgarly, but deliberately and consciously, as a relief from the stiff and conventional manner they are compelled to adopt on other occasions.

The slang term is usually not better than the word it substitutes, but it is different, sometimes more expressive, and often humorous. One of the characteristics of slang is that it is short-lived; another, that phrases popular at the moment are overworked, and therefore limit the vocabulary, because on every possible occasion that term is used, and more proper words are temporarily neglected. On the other hand, certain slang expressions are so vivid and provide so many new and useful shades of meaning that they find their way into the dictionaries, though usually with a label, such as "slang" or "colloquial." Such terms as "skyscraper," "bootleg," "bunk," "gadget," "vamp," "jazz," "hokum," and "highbrow," have come into general usage. Other phrases are so expressive and full of meaning that they seem to fill a definite full of meaning that they seem to fill a definite place; examples are "You said a mouthful," "cold feet," "apple-sauce," "wise crack," "blurb," "razz," "ghost writer," "dressed up like Mrs. Astor's plush horse," "profiteer," "hard-boiled," "double-cross," "stuffed shirt," "hay-wire," "ritzy," "scab," "rubberneck wagon," "easy mark," "scram," in the dog house." The sources of slang are many and varied, and the metaphor is the principal basis. Cur-

and the metaphor is the principal basis. Current news events, political and national problems, wars, inventions, trades, amusements, and college life, all contribute their share of slang. From the circus we get such slang as "spieler" for a side-show announcer and from the theater, "trying it on the dog" and "playing in the sticks" for testing a small-town audience's reaction. Picturesque examples of aviation slang are "put it on hot," meaning a fast landing which often "overshoots" the field; "peppy crate," meaning a plane in good flying condition; and "Chinese landing," explained by the monosyllabic phrase "one wing low." Large cities, with their gangs and special crime problems, have brought forth such words as "racket," for a dishonest though profitable business; "pineapple," for the bomb used by the gangsters because its shape resembles that fruit; and "take for a ride," meaning to eliminate a rival gangster by murder. Radio has lent many of its technical terms to slang, and developed others, for one who gossips is said to "broadcast"; disagreeable interference is "static"; to await developments is "to stand by"; and to depart or stop is "to sign off."

University undergraduates refer quite generally to their president as "prexy," to an engagement as a "date," and to their studies by abbreviations or nicknames, such as "ec" for economics," "ag" for agriculture, and "chem" for chemistry. World War II gave rise to many slang expressions. Typical are "vackie" for an evacuated person; "Paul Pry," a searchlight; "dumplings" for the bombs dropped; "Mona, an air-raid signal; and "Clara," the all-clear signal. In a cheap restaurant, when the waiter shouts "Adam and Eve on a raft," he wants fried eggs on toast; "to sink them" is to demand them scrambled. "Mrs. Murphy" is a potato; "Mrs. Murphy in a sealskin coat" is a baked potato; and "sinkers" and "java" mean doughnuts and coffee. Many of the current slang phrases not dependent for their origin on new inventions and developments can be traced to very ancient sources, and, having been discarded are brought out again as new slang, sometimes without knowledge of the former use, and probably suggested by the same conditions as the original appearance. "Fresh" and "dumb," which originated during Elizabethan times, illustrate this revival tendency.

Slang is put into use and popularized by the newspaper writers, comic strips, moving pictures, political campaigns and speeches, novels and periodicals, plays and musical comedies, in pool halls, on race tracks, street corners, wharves, and in other public places. When of a current source and short duration, slang shows the date of its use, just as a style in dress tells its season. Thus, examples of slang's instability are "oomph girl," "jitterbug," "binge," "cat's pyjamas," "boloney," and "swelegant."

The people of the United States are thought to be particularly addicted to slang, but the language of almost every country is full of these picturesque expressions, and slang dictionaries have been written in every language, to aid in the understanding of the current speech and literature. Mere dialect peculiarities, or idioms of some one locality or class of persons, are not

to be classed as slang (see IDIOM).

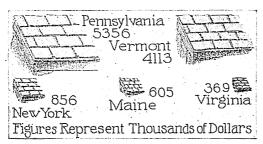
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upon which the coloring matter has been spread, and then baking the stone. Very beautiful designs are produced in this way.

The most extensive slate quarries in the United States are in Pennsylvania, Vermont,

Its Dangers. The use of slang has certain dangers. It tends to narrow a person's vocabulary, and to do away entirely with fine shades of meaning. The tendency is to overwork an expression until one is weary of the very sound of it. The first time anyone said, "That's a wow of a gown," the figure was forceful, and perhaps conveyed the idea better than any other expression could have done; but if "a perfect wow" is applied to everything attractive, from a salad to a Beethoven sonata, the force is lost, and a number of expressions are ignored which might far more accurately ex-

press the idea. E.B.Z. SLATE. In some modern schoolhouses, we find blackboards of stone. They are usually of a dark-gray or a purplish-brown color. They

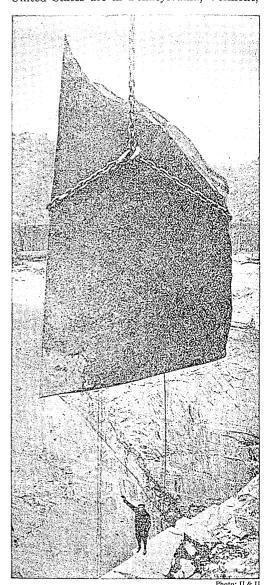


A YEAR'S PRODUCTION

The five leading states which quarry slate.

have a smooth, even surface and are pleasing to write upon. It may be that the roof of the schoolhouse is covered with the same sort of stone. Thin slabs of this stone, not many years ago, were smoothed on both sides, cut into small sizes, enclosed in wooden frames, and widely sold for school children to write on; that day has passed in America, except in some district schools. This stone is slate, a rock formed by the metamorphism, or alteration by heat and pressure, of less compact material. Most slates have been formed by the compacting of muds, clays, or other fine-grained sediments, but some have their origin in basalts, volcanic ash, or other igneous rocks. Many slates are metamorphosed shales.

Slate splits into thin layers, and varies in color from light gray to green, red, brown, and almost black. It is of different degrees of hardness, but all varieties are easily scratched with a knife. It is found in all localities where metamorphic rocks have been formed, and the layers are often tilted at various angles. It is one of the most durable rocks, withstanding weathering as well as granite. The best varieties are used for blackboards and for covering roofs, and formerly were much used for writing slates and for mantels. Slate is also used for sanitary and electrical appliances. Marbleized slate is made by painting the background on the stone, dipping it in water



SIX TONS OF SLATE

There is so much waste in the preparation of slate for the market that the mass shown above will make about enough of the finished product to cover one good-sized roof. The photograph was taken in a quarry in Pennsylvania. The block was raised eight hundred feet.

New York, Maine, and Virginia. The most important quarries of Europe are in Wales. Even in the United States, most of the workers in the slate quarries are Welsh.

A.J.

Related Subjects. The reader is referred in these volumes to the following articles:

Cleavage Geology Metamorphism Quarry and Quarrying Sedimentary Rocks Shale

SLATER, SAMUEL. See RHODE ISLAND (Manufactures); THREAD.

SLATER FUND, an endowment of \$1,000,000, made in 1882 by John Fox Slater, a New England manufacturer, for the purpose of conferring a "Christian education on the lately emancipated population of the United States." For this gift Congress voted a resolution of thanks to Mr. Slater, and presented him with a medal. The fund was placed in charge of a board of trustees, who have, during the intervening years, increased the original sum.

The fund has been devoted principally to the support of those negro schools which specialize in normal and industrial training, including the Tuskegee Normal and Industrial Institute and the Hampton Normal and Agricultural Institute, both of first importance. The money is used to pay salaries of teachers, directors, and principals, and for building, supplies, and operating expenses.

SLAV. See SLAVS.

SLAVE LAKE, GREAT. See GREAT SLAVE LAKE.

SLAVE RIVER. See GREAT SLAVE RIVER. SLAVERY. Our barbarous ancestors, when they fought, did not make captives. They did not merely conquer their enemies; they destroyed them. So slavery, when it came, was a forward step in the march toward the brotherhood of man; for, although it ignored the rights of fellow creatures, it at least recognized their usefulness, their ability to benefit the world by their presence. Captive men and women did the rough work of a community, and their masters gained leisure timechiefly time to be idle, but also time to think. Had the older system of slaying all enemies persisted, we might never have reached the state of society which gave us Abraham, Moses, and David, Homer, the many artists of ancient Greece, and Cicero, Horace, and Vergil, who have so profoundly influenced the world.

But the slavery of those taken in war was a different thing from the enslavement of fellow citizens for debt or the trafficking in men and women of a lower state of civilization, who could by no stretch of the imagination be considered enemies. And history records that, while slavery of the first type ended gradually through economic and political changes, slavery for debt and slavery of the black race were destroyed by moral uprisings.

Slavery in the Ancient World. When Abraham made his covenant, it applied both to Abraham's family and to him—

that is born in the house, or bought with money of any stranger,

and slavery continued among the Hebrews until they themselves were carried away into captivity. But the laws of Moses provided that all slaves should be well treated, that a Hebrew servant should go free after six years, and that a foreigner should be liberated in the year of jubilee, which occurred twice in a century.

The story of Ulysses' visit in disguise to the swineherd Eumaeus, in the Odyssey, teaches us that, in Homer's time, slaves were kindly treated, and that they were purchased from pirates and were sometimes of higher birth than their masters. Later, it was customary for men in poverty to sell their children or publicly abandon them, and for debtors to sell themselves for their debt; but Plato and his followers declared that one Greek ought never to make a slave of another. Like Aesop, who is said to have been a tutor, slaves could hold positions of responsibility, and could sometimes purchase their freedom.

In Rome, slavery flourished as long as the legions continued their conquests. Wealthy men maintained large numbers of slaves recruited from war, piracy, and a special slave trade, and some authorities believe that at the height of the empire there were three slaves to every single freeman. Slaves were often given their liberty and sometimes rose to greatness, as did Terence and Epictetus. The advent of Christianity had less to do with the end of Roman slavery than the stoppage of the sources from which slaves were drawn. There was, in fact, no sudden shift from slavery to freedom, but a gradual change into serfdom.

Modern Revival of Slavery. Just before the middle of the fifteenth century, Portuguese explorers in Africa were given several black slaves in ransom for Moors whom they had captured, and the Portuguese began the capture and transportation of negroes into Europe. In 1516 Charles V of Spain gave permission to carry slaves into the colonies, and so profitable did the trade prove that several nations engaged in it. By the time of the American Revolution, the British were carrying more than half of the blacks that were brought to the Western world.

Though Denmark was the first nation to decree the end of the slave trade, in 1792, it was in England that the great fight against it was begun. The English Quakers started the movement in 1671; their American brethren in 1696. However, Rhode Island enacted the first legislation in America on slavery, and in 1652 ordered that no black or white man should be held in service longer than ten years, or be sold. Through the efforts of Thomas Clarkson and William Wilberforce, the House of Commons passed a bill against the trade in 1792, which became law in 1807. In January, 1808, a law became effective whereby the

addien wie metert in der et fiet en die angeben der hande gegen der er besteut besonder

United States prohibited the further importation of Africans.

The history of slavery in the United States can best be studied through the list of related topics given below. Franklin, Adams, and Hamilton from the North, and Jefferson and Madison from the South, opposed it, and Washington, though he owned slaves, freed them in his will, previously declaring, in his "Farewell Address," that it was among his "first wishes to see some plan adopted by which slavery in this country may be abolished by law."

In Haiti, where there were sixteen blacks and one mulatto to every white, the slaves under Toussaint revolted against the French in 1701, and established a republic. Great Britain freed all slaves in its colonies in 1833, and other European nations gradually followed. Most of the South American republics declared all men free from the beginning of their independent existence, but Brazil did not take the step until 1871. Though slavery is nonexistent in North America and Europe, it still survives in various countries in Asia and in Africa.

Related Subjects. The following articles in these volumes have a bearing on the subject of slavery. The majority deal with United States history, but a few have a more general significance:

Abolitionists
Brown, John
Compromise of 1850
Confederate States of
America
Crittenden Compromise
Dred Scott Decision
Emancipation Proclamation
Epictetus
Fugitive Slave Laws
Garrison, William Lloyd
Helots
Jubilee
Kansas-Nebraska Bill

Lecompton Constitution Lincoln, Abraham Mason and Dixon's Line Missouri Compromise Phillips, Wendell Reconstruction Serfs Terence Toussaint, François Dominique United States (History) War of Secession Wilberforce, William Wilmot Proviso

SLAVONIA, slah vo' nih ah. See Croatia and Slavonia; Yugoslavia.

SLAVS, slahvz, or slavz, OR SLAVONIANS, slah vo' nih anz, the general name of a group of peoples forming a branch of the Aryan family, who live chiefly in Eastern Europe and Siberia. They number approximately 200,000,000, according to recent estimates, and include Russians, Poles, Wends, Ruthenians, Czechs (Bohemians and Moravians), Slovaks, Slovenians, Croats, Serbians, Bulgarians, Montenegrins, and the peoples of Bosnia and Herzegovina. They are somewhat shorter than the average Aryan, and have broad heads, pale-white, swarthy, or light-brown skin, and brown, gray, or black eyes.

The primitive meaning of the term Slav was speech, and the common designation of servitude is repudiated by the members of the race, who like to think of it as meaning glory or fame. Their original lands were located in the valleys of the Vistula, Pripet, and Dniester rivers. Migrating toward the lower Danube

and into the Balkan peninsula, the branch known to-day as the Yugoslavs came into being, and included in its number the Serbians, Croats, and Slovenes. Those who moved north and east were later called Russians, Poles, Ruthenes, Czechs, and Slovaks.

Some of the racial characteristics of the Slavs help to explain their history, accounting in part for the long years of oppression they suffered and the foreign domination of all their groups except the Russians. lacked the community spirit of their Teutonic neighbors, and were unwilling to subordinate their individuality to authority, or to offer the cooperation necessary for united action. They are brave, adventurous, and fond of wandering, and they make splendid soldiers and daring pirates. Naturally artistic, they are lovers of music and poetry. In addition to their inherent disposition, geographical position also was a contributing cause to the suppression of their national aspirations; hemmed in by Germans on the one side, and the Magyar and Turkish tribes on the other, they were able to do little more than sustain their racial identity. Indeed, the Slavs would very probably have become assimilated by other nationalities, but for the efforts and ideals of such leaders as Johann Comenius (1592-1670) and Joseph Dobrovsky (1753-1826), who inspired movements of Pan-Slavism and besought their fellow Slavs to preserve their language, literature, and culture.

In 1830 there was organized in Russia the Slavophils, a society born with the ideal of arousing national consciousness, uniting the elements of the Slav race by a common language, and reviving their literature and history. Reminded of the glorious deeds of their ancestors, and inspired by the fervor with which their leaders pictured the future of the Slav race and pointed out its proper place among the nations, these subjugated people grew restless and dissatisfied. Soon they began to demand a national unity and freedom from the foreign political domination which had inhibited their development. Dissension was rampant in all the states in which there were large Slav populations, and the Balkans, in particular, became a hotbed of discontent which perhaps never will cool down.

Pan-Slav congresses were held in 1848, and again in 1867, at which time Neo-Slavism replaced the old Slavophil movement, and the right of all the Slav nations to work out their own destiny according to their own ideals and background was asserted. The self-centered national interests of these people, to the exclusion of all compromise or coöperation, long prevented the success of any of their movements. It is true that everything dear to them was taken from them—their children were not allowed to use the Slav languages in the



schools, they had no representation in the governments of countries in which they formed the greatest portion of the population, and their literature was suppressed. But when opportunities presented themselves, each element of the Slav race was so intent on its own aspirations that it was unwilling to make the sacrifices necessary for harmony in a united Slav nation.

Following World War I, at the Peace Conference, where self-determination and the rights of small nationalities were cardinal principles, the Slav races under foreign control told their story and made their pleas. As a result, Czechoslovakia, made up chiefly, as the name suggests, of Czechs and Slovaks, was created a new and independent republic, but in 1939 was dismembered by Adolf Hitler and added to Germany (which see). Yugo-slavia was likewise formed as the State of the Southern Slavs, but it was invaded and occupied by Axis forces in 1941. Ukraine, containing most of the Ruthenians, was made an independent state in the Union of Socialist Soviet Republics. The Ruthenians in eastern Galicia remained under Polish rule until 1939, when the Russians occupied that territory. c.w.

Related Subjects. The reader is referred in these volumes to the following articles:

Austria-Hungary (racial map)
Balkan Peninsula
Bosnia
Bulgaria
Comenius, John
Croatia and Slavonia
Czech
Czech
Czech
Vuraine
Czechoslovakia

Auntenegro
Rumania
Russia
Ruthenians
Serbia
Slovaks
Clovaks
Vugoslavia

SLEEP, the state during which the nervous system renews the energy expended during the waking hours. The beneficent effects of sleep are known to every one, and no one will say that this rest period of tired humanity is overpraised by Shakespeare, in his familiar lines from *Macbeth*:

. . . the innocent sleep, Sleep that knits up the ravell'd sleave of care, The death of each day's life, sore labor's bath, Balm of hurt minds, great nature's second course, Chief nourisher in life's feast.

Coleridge, too, in *The Ancient Mariner*, says of sleep that

Beloved from pole to pole.

Throughout the active hours of the day, energy is used up faster than it is stored, and the tissues are worn faster than cells are formed to repair them; therefore, both the mind and body need periods of rest. The most complete rest is found in sleep. The conscious activities of the mind cease, the heart beats more slowly, the respiratory movements are less frequent, and the muscles are relaxed. An infant sleeps most of the time; a young child

needs twelve hours of sleep out of the twenty-four; while eight hours is ordinarily sufficient for the adult. Sleep at night is more refreshing than that in the daytime. It is deepest during the second hour after going to sleep, and the nervous system receives a greater shock if the sleeper is awakened during this hour, than at any other time. Insomnia, or chronic sleeplessness, is a distressing ailment which should never be neglected.

Sleeping Porches. The lungs call for pure air, and sleep is most refreshing when the sleeper is supplied with an abundance of pure air. Tuberculosis and other lung diseases are frequently cured by sleeping in the open air. The most sanitary of modern dwellings are provided with sleeping porches which are so located as to seclude the occupants from view, and so protected with screens as to keep out flies and mosquitoes. With proper protection in the way of bedding and night robes, these porches may be occupied throughout the year.

Related Subjects. The reader is referred to:

Baby Hygiene
Dreams Insomnia
Health Habits Life Extension (Rule 14)
Heating and Ventilation Somnambulism
(The Ventilating Problem)

SLEEP, for children. See Fatigue and Nervousness among Children.

SLEEPING CAR. See Pullman, George M. SLEEPING SICKNESS, a name popularly applied to two human diseases, both of which may be characterized by profound lethargy. It is also a disease of horses.

African Sleeping Sickness, technically known as trypanosomiasis, a disease caused by certain species of animal parasites. It is prevalent throughout parts of Africa, and is transmitted to man through the bite of the tsetse fly. The early symptoms are irregular fever, headache, inability to sleep, and weakness. The glands all over the body are enlarged, and a red eruption appears on the skin. As the disease progresses, the victim grows continually weaker, and a desire for sleep comes upon him, increasing until he can with difficulty be aroused. There are tremblings of the hand and tongue which, toward the last, develop into convulsions. The disease is nearly always fatal to white men, unless checked in the early stages. In Africans the death rate is variable. In some sections, the natives seem to have acquired a natural immunity, and a large percentage recover. In other places, mortality The so-called Rhodesian type of sleeping sickness is more acute, more rapidly fatal, and more resistant to drugs than other

Sleeping sickness is treated by arsenic compounds, antimony compounds, and by a secretly composed drug of German invention,

6642

called Bayer 205. The latter is especially useful in treating white men infected with the Rhodesian type. The French chemists of the Pasteur Institute have produced a drug believed to be identical with Bayer 205, which they call 309. Tryparsamide, an arsenical compound prescribed for locomotor ataxia, is also used for sleeping sickness. All of these drugs must be used with great care, because of their powerful effects.

Prevention and control of sleeping sickness are being studied by an international com-Methods in general favor include isolation of infected persons, systematic blood examinations of persons in an infested area, and avoidance of regions known to harbor the tsetse fly. See also Tsetse Fly; Zoölogy (How Zoölogy Affects Human Welfare).

Encephalitis Lethargica, a disease caused by an organism not yet isolated, has occurred in many different parts of the world since 1915. Though commonly called sleeping sickness, its technical name means inflammation of the brain with resulting lethargy. The symptoms are slight fever, stupor, somnolence, and paralysis of some part of the face. Although the name sleeping sickness has been applied to this disease in a large proportion of the cases, there may be sleeplessness rather than sleepiness, and excitement rather than stupor. Comparatively few people seem to be susceptible, and but one case, as a rule, develops in a household. Death rates, as reported, vary from twenty to fifty per cent. The disease was first widely heard of in connection with the world epidemic of influenza that claimed so many victims in 1918. Physicians, however, have failed to find any proof that the two are caused by the same organism. Careful nursing, making the patient comfortable, and attention to hygiene are the chief points in treatment. Mild cases may recover in a few days, but severe attacks may persist for weeks. Parkinson's disease, or paralysis agitans, is one of the most frequent after effects. Another one is a change in personality, showing irresponsible behavior and mental changes merging into insanity.

Sleeping Sickness of Horses, a name commonly given to equine encephalomyelitis or Borna disease; said to be transmitted by mosquitos.

SLEEPLESSNESS. See Insomnia. SLEEPWALKING. See SOMNAMBULISM.

SLEET. See HAIL.

SLEIGHT, slite, -OF-HAND. See Con-

SLIDELL, sli del', John (1793-1871). See MASON AND SLIDELL.

SLIDE MOUNTAIN. See CATSKILL MOUN-

SLIDE RULE, a mechanical instrument for making arithmetical, algebraical, and trigo-

nometrical calculations. It consists of a ruler with a sliding medial section; both the ruler and the slide are graduated and have similar logarithmic scales printed on their corresponding edges. A runner, or indicator, made of a transparent glass or celluloid, and having a vertical line drawn down the middle, is used to fix coinciding points on the scales. Some of the instruments have additional scales printed on both the rule and the slide, and many are double-faced, having scales on both sides of the rule and slide. The rules are usually 5, 8, 10, 16, or 20 inches in length, and the longer the rule, the greater the accuracy of its calculations. Although a knowledge of logarithms is not necessary for the employment of the slide rule, full use of the instrument cannot be had without at least an ele-

mentary knowledge of the subject.

SLIME MOLDS, minute plants of very simple structure which usually are found upon decaying wood and on soil containing a large proportion of humus. Some of them subsist as parasites on cultivated plants. Clubroot of cabbage and powdery scab of potato are considered by some to be forms of slime mold. The slime molds are of special interest because of their resemblance to minute animals. In fact, they have been described as belonging both to the animal and to the vegetable kingdom, though the consensus is that they are more botanical in character than zoölogical. The spores germinate in moist soils and in humus, forming a simple cell with a single slender, hairlike attachment, by means of which the organisms swim about. Later, they lose the flagellum (the hairlike attachment), and the cells unite in a common mass which has the appearance of jelly-a plasmodium (the vegetable body of slime molds), with the power of slow creeping movement. Finally, the plasmodium develops into masses of moldlike spores, these latter possessing a variety of forms. The masses are frequently found on stumps and bark. The largest of them may be several inches square, but they are usually much smaller.

SLING, a weapon of very ancient origin, for throwing stones or other missiles. It is probably the most ancient of all weapons for increasing the force of projectiles. In its simplest and oldest form, it consists of a leather or hide strap, to each end of which is fastened a string. The stone or other missile to be thrown is placed on the strap, and the operator holds the two cords in his hand. Whirling the sling rapidly round his head to attain velocity, he releases one end, and the missile is discharged with the initial velocity at which the sling is being whirled at the moment of release.

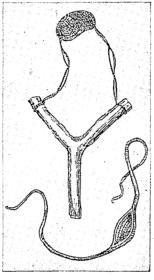
[There are many allusions to slings in the Bible, the most familiar reference being to the slaying of Goliath by David with a stone (I Samuel xvii, 49). It is also recorded that 700 left-handed slingers of the Benjamites "could sling stones at an hair breadth and not miss" (Judges XX, 16).]

The ancient inhabitants of the Balearic Islands were famed for skill with the sling, and its use was of great value to the armies of Egypt, Greece, and Rome. In the Middle Ages, slings attached to a staff were used to hurl big stones against fortifications and castles. This sling was hurled with both hands, and the size of the stone was limited only by the strength and skill of the thrower. In the ordinary one-hand sling, the stone was "the size of a man's fist."

Sling Shot. In America a small hand catapult is called a *sling shot*, or *sling*. It is made

by fastening an elastic band on each end of a forked stick, and connecting the elastics by a leather pouch in which a stone or small bullet is placed. The fork is held in one hand, and with the other hand the elastic is stretched, the thumb and first finger holding the missile in place. Suddenly released, the missile is projected with great force. Partridges, small birds, rabbits,

and squirrels are



TWO KINDS OF SLINGS

easy prey to an expert in the use of this simple catapult. In most cities, the use of slings is forbidden.

Bolas. A weapon used by the Indians, and on the pampas of many South American countries. It consists of stones or balls of clay, securely fastened to the ends of lengths of rope or cowhide, usually three in number. The free ends are tied or braided together and used as a handle. The thrower, often on horseback, whirls the weapon over his head to gain momentum, takes his aim, and hurls it at a running animal. If he is successful, the stone or ball winds itself around the animal's legs and fells it. Several variations of this weapon are used, and another type has only one rope about six feet long, with a weight attached to each end.

SLINGERS, WAR OF THE. See FRONDE.
SLING FRUITS. See SEEDS (Dispersal by

SLIP NOOSE. See KNOTS.

SLIPPERWORT, slip' ur wurt, the common name of various evergreen plants whose blossoms have something the shape of a pouch or slipper. The flowers are abundant and showy, ranging in color from creamy white to yellow, maroon, or crimson, often spotted with darker shades, and are seldom marked alike on two different plants. The foliage leaves are large, close-growing, and feltlike. The species are herbs or shrubs. Twelve inches is the usual height of the dwarfed variety of slipperwort, the taller species often reaching eighteen inches. All species are natives of South America, but several are cultivated in hothouses and gardens in America.

B.M.D.

Scientific Names. The slipperworts constitute the genus Calceolaria of the family Scrophulariaceae. The species include the spotted, yellow C. crenatiflora; the violet-flowered C. purpurea; and C. integrifolia, with small yellow flowers.

SLIVERS. See SPINNING.

SLOANE, SIR HANS (1660-1753), a British physician and collector whose private museum formed the beginning of the British Museum (which see). He was born at Killyleagh in County Down, Ireland, of Scottish parents, and studied medicine in London and later in France. From his youth he was fond of making collections, especially of natural-history specimens. As he grew older, the inclination developed until he had created a unique museum of coins, medals, antiquities, natural history, and a library of 50,000 volumes, which he bequeathed to Great Britain. In addition, he was a successful physician and won for himself many honors—election to the Royal Society and Royal College of Physicians and, eventually, to the presidency of both; to be physician of Christ's Hospital; physician general to the army; and, finally, royal physician. Sloane was the first medical practitioner to be given a hereditary title, for in 1716 George I made him a baronet.

SLOE, slo, a spiny, branching shrub, related to the plum and found in Europe, Central Asia, and on the mountains in the southern and eastern parts of the United States and Southeastern Canada. It has pure-white blossoms, which appear before the leaves and later give place to small, black fruits, about the size of a pea. The latter are used for making wine, jelly, preserves, and dyes. Canes and tool handles are made from the hardy branches of the shrub. It is also called blackthorn. B.M.D.

Scientific Name. The sloe belongs to the rose family, Rosaceae. Its botanical name is Prunus spinosa.

SLOOP. See Yacht and Yachting (Types of Rigs).

SLOTH, sloth, the common name of a family of animals belonging to the order Edentata (which see), which includes mammals

lacking in teeth or with only rudimentary ones. The sloths, as may be seen by the accompanying picture, have a most peculiar method of loco-They move along the branches of motion. trees upside down, and in this fashion they also sleep. Their hooklike claws enable them to hang securely from the branches, and they are able to sleep in this position, because once the muscles have fixed themselves, it requires a conscious impulse from the wakened animal

to loosen the hold. Sloths rarely come down to the ground, nor do they need to, for they feed on leaves, buds, and young shoots. They sleep by day and always move with great caution, for they are the prey of numerous stronger animals, and are almost defenseless. Yet, on occasion, sloths move very rapidly.

These queer animals are almost

hair is of a grayish color, which renders them inconspicuous. A sloth asleep looks very much like the stump of a bough, especially when, as is often the case, a peculiar growth of green algae is found on the hair. There are two subfamilies, one, the *Unau*, containing sloths with two toes on the front feet; and the other, the Ai, including those with three toes on these feet. All are natives of tropical America.

Scientific Names. Sloths comprise the family Bradypodidae. Typical species include the two-toed sloth of Brazil, Choloepus didactylus; the three-toed, Bradypus tridactylus; and the collared, B. infuscatus.

SLOT MACHINES, devices of various kinds, some used for legitimate purposes of trade, and others designed solely for gambling. All types work on the principle that a coin of certain named value must be deposited in a slot, and this sets the mechanism in motion. Those which serve a legitimate purpose release gum, candy, peanuts, postage stamps, cigars, toilet accessories, and other small articles, and thus a customer automatically serves himself. Automatic restaurants on this principle came into vogue in 1916. Another type of slot machine automatically delivers a specified amount of gas, according to value of the coin deposited, to the pipes and burners to which the machine is attached. There is yet another variety, which operated to show a series of stereopticon pictures, but since the advent of moving pictures, it has lost its popularity. A variation of this form included a phonograph which produced songs when a coin started the mechanism. The "nickel telephone," in which a five-cent piece automatically sounds a warn-

ing to the operator, is possibly the most useful development of the slot machine for business purposes.

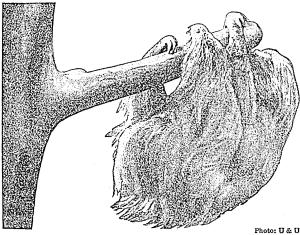
Other slot machines are gambling devices and are unlawful in most states. One variety has a wheel which is set in motion after a coin is dropped. The gambler selects a symbol; he wins if the pointer stops on the chosen one.

SLOVAKIA, a central European republic under the protection of Germany since 1939. It is bounded by Germany and Hun-

gary. Its area is 14,484 square miles; population about 2,450,000. The capital is Bratislava

For more than a thousand years, until 1918, Slovakia was a part of Hungary. Following World War I, it became a part of Czechoslovakia. On March 14, 1939, after Czechoslovakia was dismembered by Hitler, and with his support and approval, Slovakia became an independent state. See CZECHOSLOVAKIA; GER-MANY (Annexation of Bohemia-Moravia)

SLOVAKS, slo' vaks, a Slav people living in Bohemia, Moravia, and Slovakia, and in scattered settlements near by. So far as historical records show, the Slovaks have always lived in this region. Slovakland, until A.D. 907, was an independent and mighty kingdom, but in that year King Svatopluk died, and the people came under the domination of the Magyars in Hungary. They suffered great persecution under this foreign rule, and every effort was made to suppress their nationality. It is to the credit of their family life that they have been able to preserve their Slovak identity and to keep alive their language, songs, poems, and traditions; for their children were subjected to thoroughgoing



THE TWO-TOED SLOTH

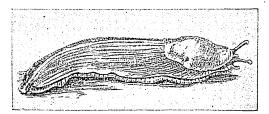
Sloths have large stomachs and little muscle. The sluggish, two-toed animal above moves at the rate of one third of a mile two-toed animal above moves at the rate of one third of a mile per hour—when he can be persuaded to move. An unusually low body temperature is partially responsible. Scientists have discovered that the sloth's speed increases 50 per cent when his temperature is raised five or six degrees.

programs of Magyarizing in the schools, and in all the public contacts which they might make. When Hungary joined Austria in the Dual Monarchy, in 1867, acts were passed for the protection of the many nationalities included in the new kingdom, but they were never enforced, and the Slovaks continued to suffer. The treaties following World War I freed them, and they united with their fellow Slavs, the Czechs, to form the republic of Czechoslovakia, dismembered in 1939. There are about 3,000,000 Slovaks in Europe. See CZECHOSLOVAKIA; SLAVS.

SLOVENIA, slove' nih ah. See Yugoslavia. SLOWWORM. See Blindworm.

SLUDGE. See ARCTIC LANDS AND SEAS (Ice Formation).

SLUG, a mollusk resembling the snails in structure and habits, but having a vestigial horny plate embedded in the body, instead of an external shell (see SNAIL). Like the snails, slugs have two pairs of tentacles, on the upper and larger of which the eyes are borne. These creatures excrete a slimy mucus as they



GIANT YELLOW SLUG About natural size.

crawl along, to facilitate their slow, dragging movement. The great gray slug, found in the vicinity of New York and Boston, is a pest in greenhouses. It likes to crawl over heaps of refuse and decaying matter, and can be held in check if such accumulations are kept out of gardens and hothouses. Another species is the giant yellow slug of California. Some florists sprinkle ashes and cinders about plants they wish to protect, as the slug that crawls over these rough, dry, dusty objects is often suffocated. See Mollusks; Gastropod. s.h.s.

Scientific Names. Typical slugs belong to the genus *Limax*. The great gray slug (four inches long) is *L. maximus*; a smaller native American species (less than one inch) is *L. campestris*.

SLUR. See TIE (music).

SLURRY, a thin mixture such as the watery grindings from a grindstone. Also applied to combinations of other ingredients of thin consistency, such as liquid mud, mortar, or cement. See CEMENT (How Portland Cement is Made).

SMALLPOX, one of the most contagious diseases known. All ages and all races are susceptible. For many centuries it was one of the greatest scourges of mankind but now there

is an almost certain safeguard in vaccination (see Vaccination). By this means as well as by quarantine smallpox is kept in check. The epidemics that do occur vary in severity. Sometimes over 30 per cent of the persons attacked die, while in mild epidemics the death rate may be less than 1 per cent.

Smallpox is caused by a very small germ of the group known as filtrable viruses and like many other diseases is transmitted by the tiny droplets expelled into the air in coughing, sneezing, or even talking. These germ-laden droplets from one harboring the infection find their way to the mucous lining of the nose and throat of another person, and from there invasion of the rest of the body takes place. The germ is also present in skin eruptions so that transmission may take place indirectly through contaminated clothing, bed

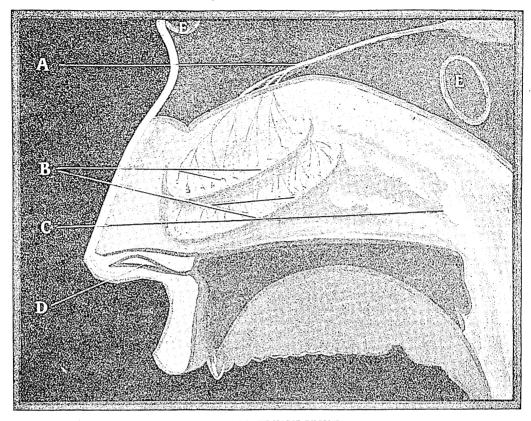
clothes, and utensils.

Ten to fourteen days after exposure the first symptoms appear. These are often a severe chill, headache, nausea, pains in the back and limbs, and fever. On the third day after onset the typical eruption begins in the form of red spots on the skin. These become raised and in a few days change to blisters which are soon filled with pus and reach their largest size on about the fourteenth day. The eruption usually appears first on the face and arms, then on the trunk and legs. This characteristic distribution helps physicians to distinguish smallpox from similar diseases. If the crisis is passed safely the skin pustules dry up, the fever drops, and improvement begins. Scabs are formed which eventually drop off leaving red or brown discoloration underneath. If the eruption has been severe, pits are left in the skin which may never disappear. These are the dreaded pockmarks.

There is no specific cure; the best procedure is to use the known methods of prevention, the most effective of which is vaccination.

THE RESIDENCE OF THE PROPERTY OF THE PROPERTY

SMELL, the special sense which enables one to distinguish odors. The sensation of smell results when the olfactory lobes of the brain are stimulated, but one always thinks of the nose rather than the brain in this connection (see Nose). Both are essential, for the brain contains the smell center, while the nose contains the cells in which the nerves of smell terminate. These olfactory cells are distributed through the mucous membrane in the upper part of the nasal cavities. They end on the surface in tufts of hairlike processes that are stimulated by odorous gases drawn up through the nostrils. The nerves leading from the cells transmit the impulse to the brain center, and it is there registered as an odor. When we sample a toilet water, we really smell the vapor arising from it. Air must pass



(A) Olfactory nerve, leading to the brain. (B) Olfactory nerve ends of smell detectors. (C) Volutions for stopping foreign objects. (D) Nasal openings. (E) Front and back sinuses.

through the nostrils before an odor can be perceived; so in smelling a substance, one "sniffs" to draw air into the upper part of the nose. Air must not only be drawn into the nostrils to be smelled, but it must be drawn over the upper part of the nasal mucosa, where the olfactory cells are located. All air which we inspire is automatically drawn through the top part of the nose, so that we smell it. Air which we expire, on the contrary, goes out over the lower part of the nose, where there are no olfactory cells. It is for this reason that

we cannot detect the odor of our own breath. The sense of smell is diminished when one has a cold, because the entire nasal mucosa is greatly congested with blood, and because the nerve endings are covered with too much mucus. The victim of a cold often complains that he cannot taste anything or that all foods taste the same. This is because taste and smell are very closely related. In fact, the enjoyment of many foods comes from the fact that we interpret their pleasant odors in terms of taste.

While the sense of smell is very delicate, it is not of long duration. Most people can detect the odor of camphor when it is diluted in the

proportion of I to 400,000, and one drop of strong perfume will scent the air of an entire room. At the same time, persons remaining in the room would soon cease to be aware of the odor, though it would be perceptible to one on entering. The sense of smell enables one to detect spoiled food and bad air, and in this respect it serves a very useful purpose. Many of the lower animals have a much keener sense of smell than human beings, and it is this faculty that makes dogs of such value in tracking game. See Nose; Taste. K.A.E.

SMELLING SALTS, ammonium carbonate drenched in perfume, for use as a restorative, for headaches, and to relieve nasal catarrh. It is only the pungent fumes of ammonia that are effective. Some of the perfumes used are oils of lavender, lemon, cloves, bergamot, and pimento. These preparations are often put up in very ornamental bottles.

SMELT. The smelts constitute a family of valuable food fishes differing from salmon only in their smaller size and in the structure of the stomach. All but one genus are found in the northern hemisphere. Smelts live in the sea, but some species ascend rivers to spawn. The common *American smelt* occurs along the

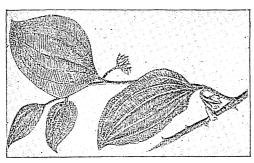
Atlantic coast from the Gulf of Saint Lawrence to Virginia, and is landlocked in various northern lakes. In winter it enters streams for the purpose of spawning, and then is caught in large numbers through holes in the ice. The body is a transparent greenish above and silvery on the sides; the average length is eight or ten inches. Large specimens are over a foot long and weigh about a pound. This smelt is often marketed after being frozen, but the unfrozen, or "green," fish are considered a greater delicacy.

Scientific Name. The American smelt is Osmerus mordax. A related species found on the Pacific coast is described in these volumes under CANDLEFISH.

SMERDIS, a usurper on the throne of Persia. See Cambyses.

SMETANA, sma tah' nah, Friedrich (1824-1884), a famous pianist and composer, called "the Beethoven of Bohemia." He was born at Leitomischl, Bohemia, and began the study of music at so early an age that when six years old he was giving public concerts. He studied at Prague and at Leipzig, where he became intimate with Schumann and Mendelssohn. When scarcely twenty-one, he was made concert master by Emperor Ferdinand of Bohemia, and during the next twelve years was busy not only with this work, but also with the directing of a music school founded by him at Prague. For some years Smetana was conductor of the Philharmonic Society of Gothenburg, Sweden, but in 1866 returned to Prague to assume the duties of musical director at the National Bohemian Theater. In 1874 he lost his hearing; this misfortune so preyed upon his mind that on his sixtieth birthday he lost his reason. He spent his last days in an asylum.

Representative Works. Though Smetana's work is Bohemian in spirit, his compositions for the orchestra are still played where the best music is appreciated. His works include the operas The Bartered Bride and Dalibor; the symphonic poems Richard III and Wallensteins Lager; a series entitled My Country; and the string quartet From My Life.



SMILAX

SMILAX, smi' laks, a genus of woody or herbaceous vines with hardy, tuberous roots, evergreen leaves veined from tip to base, and stems which end in tendrils by which the plants climb. The species are found in temperate and tropical regions, the carrion flower and the green brier (which see) being wellknown American forms. Several tropical species furnish sarsaparilla, and from the leaves of others, a sweet tea is made. The pliant stems of certain kinds are worked into baskets, and in some of the Southern states, beer is made from smilax roots, and hogs are fattened on them.

[The Smilax genus belongs to the lily family, Liliaceae. The graceful hothouse plant commonly called smilax, and used so much for decorative purposes, belongs to the same genus as the garden

SMILES, SAMUEL (1812-1904), a Scottish writer, born at Haddington. Prepared at Edinburgh for the medical profession, he practiced at Haddington and at Leeds, where he later became editor of the Times. During a considerable period of his life, he held railway secretaryships. His writings deal with a variety of subjects, but those which have been most read are didactic works, with a strong moral purpose. Among these are four volumes of inspiring quality—Self Help, Character, Thrift, and Duty.

Other Writings. These include Lives of the Engineers; Industrial Biography; and The Huguenots, Their Settlements, Churches, and Industries in England and Ireland.

SMITH, ADAM (1723-1790), founder of the science of economics (which see), was born at

Kirkcaldy, Scotland. He was educated in the University of Glasgow and Oxford University, and in his twenty-fifth year went to Edinburgh. There he gained considerable notice as a lecturer on literature and philosophy. In 1751 he was appointed professor of logic, and later of ethics, in the University of Glasgow, and in that position spent twelve happy years. At the



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ADAM SMITH

end of that period, he resigned to become the traveling companion and teacher of the Duke of Buccleuch, and remained abroad for the next three years. In 1787 Smith was elected lord rector of the University of Glasgow, an honor which he declared made him "supremely happy."

An Epochal Book. His famous and truly great book, The Wealth of Nations, appeared in 1776, and is considered the first systematic treatise on political

economy. All subsequent study of the subject has followed the general plan and principles set forth in this work. In the opinion of present-day economists, the book is frequently in error, but its value as a guide and inspiration to investigators and students of economic conditions can hardly be overestimated. It set an admirable example for economic students by its keen observation of actual facts, and its drawing of general principles from these, instead of from preconceived theories.

SMITH, ALFRED EMANUEL (1873-), an American political leader, four times elected to the governorship of New York, and the unsuccessful candidate of the Democratic party in the Presidential election of 1928.

Youth. Alfred E. Smith was born in a tenement building in the most crowded section of New York City—the lower East Side. The son of a truckman, he was largely self-educated. His parents were New Yorkers by birth and Irish by inheritance. While attending a

parochial school, he sold papers to add to the family's meager income. At twelve, after the death of his father, he was obliged to discontinue his formal education and go to work in earnest, to help support his mother and sister. He became a newsboy and picked up any other odd job he could find, quite frequently beginning his day's duties at four in the morning. For seven years he worked in a fish market on Fulton Street, winning the friendship of



ALFRED E. SMITH

the customers because of his ability as a talker, entertainer, and generally sociable person.

Political Career. Interested in politics from his early youth, he learned the "game" from the precinct up. At the age of twenty-two, he became a clerk in the city jury commission, where he remained seven years. In 1903 he advanced to membership in the general assembly of the state legislature. Eight years later, he became Democratic assembly leader, and two years thereafter (1913), he was elected speaker of the assembly. By this time he had gained a reputation for "getting things done" and for his wide knowledge of state affairs.

In 1915 Smith was a delegate to the New York Constitutional Convention. From 1915 to 1917, he was sheriff of New York County; then he was made president of the Board of Aldermen of Greater New York. In 1918 he was elected governor for a two-year term

(1919-1920). Though defeated for reëlection in 1920, in the Harding landslide of that year, he ran far ahead of the Democratic leaders on the national ticket, and was reëlected governor in 1922, and again in 1924 and 1926. His fourth term ended December 31, 1928.

He is the second man to be given a third and then a fourth term in the governor's chair in the Empire State. He stood consistently for progressive legislation, and in his fight for constructive reforms, he had the aid of such distinguished Republicans as Elihu Root and Charles E. Hughes. He evinced genuine sympathy for the common man, the child worker, and the tenement dweller.

In 1924, at the Democratic National Convention in New York, Smith contended for the Presidency against Imore than a dozen aspirants, in the longest and most turbulent contest of the kind in the history of the United States. Four years later, he was the almost unanimous choice at the Democratic National Convention held at Houston, Tex., and editorial writers hailed his nomination as representing the dawn of a new political era. A man who came from "the sidewalks of New York," a member of Tammany Hall, a devout Catholic, a foe of prohibition, and a man who never had held office outside of his own state, had been selected as the national standardbearer of the Democratic party. One newspaper committed to his party thus gave testimony to Smith's strength: "The prestige which he has won and the influence which he has conquered have come to him, not as the gift of a party machine, but as the result of his unexampled record as a faithful and fearless execu-

The campaign, which was marked by uproarious demonstrations wherever Smith appeared, in an extended speaking tour, centered on two issues, religion and prohibition. Party lines were crossed in an unprecedented manner. Smith received 15,042,366 popular votes, the largest number ever cast for a Democratic nominee; but he won only eighty-seven electoral votes.

Following the expiration of his term as governor, he was variously employed: as president of Empire State, Inc., chairman of the board of the Lawyers Trust Co., director of the New York Life Insurance Co., director of the Knott Hotels Corporation, and trustee in reorganization of the Postal Telegraph and Cable Co.

His autobiography, Up to Now, was published in 1929. From 1932 to 1934 he was editor of the New Outlook. See also Hoover, Herbert C.; Roosevelt, Franklin D.

SMITH, DONALD ALEXANDER. See STRATH-CONA AND MOUNT ROYAL.

SMITH, EDMUND KIRBY (1824-1893), an American soldier, one of the most fearless Confederate officers in the War of Secession. He

was born at Saint Augustine, Fla., was graduated at West Point in 1845, and served with distinction in the Mexican War, being twice brevetted for gallantry. From 1849 to 1852, he taught mathematics at West Point, and in 1855 was appointed captain of cavalry. On the secession of Florida, he resigned his commission in the United States army, and in 1861 became a brigadier general in the Confederate service. He served under Joseph E. Johnston and led the advance of Bragg's army in the Kentucky campaign. In 1863 Smith was given command of the Confederate forces west of the Mississippi, and in 1864 he defeated General Banks in the latter's Red River expedition. His forces were the last to surrender at the close of the war (May, 1865).

General Smith became interested in commercial enterprises after the war, and from 1866 to 1868 was president of the Atlantic and Pacific Telegraph Company. In 1870 he was appointed chancellor of the University of Nashville, remaining there until 1875. From 1875 until he died, he was professor of mathematics in the University of the South, at Sewanee, Tenn.

SMITH, FRANCIS HOPKINSON (1838-1915), a versatile American author, architect, artist, and

engineer, was born at Baltimore. He was educated for civil engineering, and attained success as a designer and builder of lighthouses, sea walls, and other large masonry works. He built the foundation for the Statue of Liberty, in New York Harbor. His avocations, painting and literature, made him more famous than his vocations. He was awarded numerous medals for landscapes



F. HOPKINSON SMITH

in water colors and for charcoal drawings; as a writer, he showed his training as an artist, for his descriptions are delightful in their sureness and delicacy of touch, and each story has its own atmosphere, as does a painting.

His Writings. In Colonel Carter of Cartersville, Smith probably attained his greatest literary success, but A Genlleman Vagabond, Caleb West, The Under Dog, The Fortunes of Oliver Horn, The Tides of Barnegat, Peter, Colonel Carter's Christmas, and others have an almost equal charm in characterization, quaint humor, and local color. Colonel Carter of Cartersville was dramatized, with very few changes, by Augustus Thomas, and was highly popular. Felix O'Day, a novel, and Outdoor Sketching were published after his death.

SMITH, FREDERICK M. See LATTER DAY SAINTS, REORGANIZED CHURCH OF.

SMITH, GOLDWIN (1823-1910), a man of letters whose writings on history and on the

affairs of the day spread his fame wherever English is spoken. He was born at Reading, in Berkshire, England, was educated at Eton and at Magdalen College, Oxford, and in 1847, was called to the bar, but made no attempt to practice law. For eight years he was professor of modern history at Oxford. In 1864 he delivered a series of lectures in the United States, and in 1868 removed to that country and became professor of



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GOLDWIN SMITH

English and constitutional history at the newly organized Cornell University, Ithaca, N. Y. Three years later, he resigned, thereafter making his home in Toronto, Ont.

His Writings. Smith contributed to the chief English and American papers, and in Toronto founded The Canadian Monthly, The Nation, The Week, and The Bystander. Everything that came from his pen commanded an interested audience. His historical writings, which include Irish History and Irish Character, A Short History of England Down to the Reformation, and Irish History and the Irish Question, are marked with extraordinary vividness, and show, moreover, sound historical judgment, but he stirred up much antagonism by advocating the political union of Canada with the United States.

His writings were very numerous; in addition to those noted above, the following may be mentioned: My Memory of Gladstone, In Quest of Light, Guesses at the Riddle of Existence, and Labor and Capital.

SMITH, Hoke (1855-1931), American journalist and political leader, born in Newton, N. C., but after 1872 a citizen of Georgia. When only eighteen years old, he was admitted to the bar. Smith became a leader in his profession, and also found time to make the Atlanta Journal, which he owned from 1887 to 1898, one of the leading newspapers of the South. His first activity in politics was as delegate to the Democratic state convention of 1882; he was Secretary of the Interior from 1893 to 1896, in Cleveland's Cabinet, and was governor of Georgia from 1907 to 1909. He was reëlected governor in 1911, but resigned after a few months to fill an unexpired term as United States Senator. He was reëlected in 1914 for the term ending March 4, 1921. On leaving the Senate, in 1921, Smith returned to Atlanta to practice law.

SMITH, HYRUM. See MORMONS.

SMITH, JOHN (1580-1631), a famous leader of the English settlers of Virginia in 1607, was born at Willoughby, Lincolnshire, England. His adventures as told by himself are marvelous, and cannot be credited entirely. As a soldier of fortune serving in the Protestant wars against the Saracens, he stated that he



These are the Lines that show the Face; but those
That show the Grace and Glory, brighter bee:
The Faire-Discounter and Fowle-Overthrowes
Of Salvages, much Civilled by the Best shew the Spirit; and to it Glory (Went)
So, thou art Brase without, but Golde within.

CAPTAIN JOHN SMITH From an old painting.

killed three gigantic Turks in single combat in Transylvania, and thereby received his coat-of-arms, emblazoned with three Turks' heads. Taken prisoner in the Battle of Rothenthurm, he claimed to have been sold as a slave and given to a Turkish lady, who fell in love with him; but, desiring freedom above all else, he killed his overseer and made his escape, eventually reaching England.

It is a matter of record that in 1606 Smith sailed as an ordinary colonist in the expedition to Virginia, but showed such ability that, soon after the settlement of Jamestown, he became executive head and ruled so firmly that order quickly succeeded confusion. All stores were held by the settlers in common, which invited laziness on the part of a few, who were loath to toil. Smith cured this inertia by declaring, "He who will not work shall not eat."

Captured by Powhatan in December, 1607, he declared he was saved by the Indian girl Pocahontas, who threw her body on his, when the executioner's ax was about to fall (page 5794). The truth of this story is doubted, though many Indian stories contained just such episodes. Smith was so badly wounded by an explosion of gunpowder, in 1609, that he was compelled to return to England. In 1614 and 1615, he explored the New England coast, made fairly accurate maps, and wrote interesting descriptions of what he saw; for this service he received the title "Admiral of New England."

"A restless, vain, ambitious, overbearing, blustering fellow, who made all men either his hot friends or his hot enemies," one biographer says of him; he nevertheless belonged to the sane and wholesome class of men that can plan and can do. Smith was a man of great energy and versatility, and will always hold a high place as one of the founders of American

civilization.

His Writings. His True Relation of Virginia, Description of New England, and The Summer Isles were his main writings. The Pocahontas story is not told in his True Relation of Virginia, which he published in 1609, just two years after so memorable an event is supposed to have happened. Though partly discredited by historians, his writings are vivid, interesting, and even exciting, for he wove into his adventures local color of the time, the life and customs of the people, and a picture of that primitive land.

Related Subjects. The following articles in these volumes will explain the references in the foregoing discussion of John Smith, and will give further information:

Jamestown Pocahontas Powhatan Saracens Virginia (History)

SMITH, JOSEPH (1805-1844), the founder of the Church of Jesus Christ of Latter Day Saints, whose adher-

ents are commonly known as the Mormons. He was born at Sharon, Vt. Early in life he showed those hereditary tendencies that had so large a part in shaping his career, for both his parents and grand-parents were believers in heavenly visions and miraculous cures. The Smith family moved to Manchester, near Palmyra, N. Y., in 1819, and the boy began work as a farm laborer. In



JOSEPH SMITH
The founder of the Mormon Church.

1820, during a season of religious revival, he received, according to his own account, a vision directing him not to join any existing religious

sect, but to await spiritual guidance as to his future. This was the first of the series of visions which were declared to have been the inspiration of the *Book of Mormon*, and out of which developed the great Church now centered at Salt Lake City, Utah.

In these visions, Smith was told where he would find buried a number of gold plates, upon which were inscribed "the fullness of the everlasting gospel." He was told, as he himself said, to dig in a mound four miles from Palmyra, and there he claimed to have found the plates. These he translated from the "reformed Egyptian," in which he said they were written. He did this work shielded behind a thick curtain. The information they contained, which is embodied in the Book of Mormon, he made the foundation of his new Church. This sect, which he named the Church of Jesus Christ of Latter Day Saints, or the Mormon Church, was organized in 1830 at Fayette, N. Y. Smith claimed to have received the priesthood of Aaron from John the Baptist, and the priesthood of Melchizedek from Peter, James, and John. His followers quickly recognized him as a prophet, and, as the religious unrest of the times was favorable to the founding of a new sect, he soon was the leader of a large group of Mormon believers.

Shortly after the organization of the Church at Fayette, Smith sent out a number of missionaries. Among their first converts was Sidney Rigdon, then pastor of a church of the Disciples of Christ in Mentor, O. Rigdon at once became a Mormon leader, and in 1831 accompanied Smith to Kirtland, O., where he gave valuable assistance to his leader in establishing the new sect. There a general store, a steam sawmill, and a tannery were soon being operated by them; land was bought and a great city platted, and they consecrated a stone temple worth \$40,000. Another of the early converts was Brigham Young, who joined Smith at Kirtland in 1832, and whose qualities of leadership, persuasive eloquence, and practical sense were destined to exert a powerful influence on the history of the Church.

From the beginning, difficulties beset the community at Kirtland. There were persecutions from without and dissensions within the body, and an attempt to depose Smith was thwarted only by the determined opposition of Young and Rigdon. Notwithstanding these difficulties, before the settlement broke up most of the details of the Church organization were worked out. During the years at Kirtland, Smith, with untiring zeal, was sending out missionaries and attempting to spread his doctrines in the states farther west. Mormon emigration to Missouri had begun as early as 1830, and in 1838, when the settlers in Kirtland were driven out, Smith and Rigdon fled to a new settlement called Far West (now

Kerr), in Caldwell County, Mo. There the Mormons were at once in conflict with the native Missourians, and Far West soon surrendered to a force of state militia.

The scene of Smith's activities was then removed to Nauvoo, Ill., where a numerous body of his followers was already encamped. In December, 1840, the state legislature granted them a charter giving Smith nearly unlimited civil authority. The city grew rapidly, a university was established, and in 1841 the foundation of their new temple was laid. Yet the fair outlook in the new and beautiful settle-ment was not destined to fulfill its promise. Smith aroused enmity here, as elsewhere, because of his clashes with civil authority. Furthermore, it was rumored that he had had a revelation establishing and approving polygamy, which aroused indignation throughout the community. A newspaper was established to oppose him, but he drove its editors out of the city. In 1844 there was a general uprising against the Mormons, and Smith put Nauvoo under martial law.

At this critical period, his most efficient lieutenant, Brigham Young, was away on a gospel mission to the Eastern states, and the Mormon leader found the tide too strong for him to fight alone. Arrested on the charge of treason, Joseph and Hyrum Smith (a brother) and others were placed in the jail at Carthage, on June 25. On the night of the 27th, a mob, aided by the militia guard, broke into the prison and shot the brothers. Brigham Young then became the Mormon leader.

Related Subjects. In connection with this study of Joseph Smith, the reader will find the following articles of interest:

Latter Day Saints Mormons Polygamy Salt Lake City Utah Young, Brigham in paramental management de la company de

SMITH, SAMUEL FRANCIS (1808-1895), an American poet and clergyman, author of the great poem *America*, which has become one

of the country's national hymns. Born at Boston, he was graduated from Harvard College in 1829, in the same class with Oliver Wendell Holmes and James Freeman Clarke. He pursued further study in Andover Theological Seminary, and was ordained in the Baptist ministry in 1834, in that year becoming pastor of a church at Waterville,



Photo: Brown Bro

SAMUEL F. SMITH

Me., and professor of modern languages in Waterville College. He served as minister at

Newton, Mass., from 1842 to 1854, and for the first six years of this period edited *The Christian Review*, published at Boston. From 1854 to 1869, Smith took an active part in preparing the publications of the American Baptist Missionary Union. At length he devoted most of his time to the work of this society, and made two trips around the world, investigating its numerous stations.

Smith's Fame. His renown rests upon America, first sung in Park Street Church, Boston, July 4, 1832; but he wrote a large number of other well-known hymns, among them The Morning Light 1s Breaking. He was the author of several books on missionary topics, such as Missionary Sketches and Rambles in Mission Fields.

[For details of the origin of America, see the article under that title.]

SMITH, SYDNEY (1771-1845), an English clergyman and humorist, born at Woodford, Essex. He was graduated from New College, Oxford, where he was later given a fellowship, and in 1796 became curate of Nether Avon, on Salisbury Plain. Two years later, he removed to Edinburgh, where he engaged in preaching and tutoring; there he helped Brougham, Jeffrey, and other men of eminence to establish the Edinburgh Review. To this periodical he continued to contribute for twenty-five years. In 1804 he began in London a series of lectures on moral philosophy which were brought to an end in 1806, when he became rector of Foston-le-Clay in Yorkshire. After twenty-two years of service there, he was presented with the more desirable rectory of Combe-Florey, and from 1831 until his death, in 1845, he was a resident canon at Saint Paul's, London.

Writings. Notable among his writings are the Letters on the Subject of the Catholics, which helped to secure Roman Catholic emancipation. He also wrote a series of letters On the Ecclesiastical Commission and On American Debts. Smith's humor is powerful, yet always good-natured. The following quotations will give some idea of his manner and the whimsical quality of his humor:

Looked as if she had walked straight out of the Ark.

My living in Yorkshire was so far out of the way,
that it was actually twelve miles from a lemon.

It is not more than a week ago that I heard him speak disrespectfully of the equator.

SMITH COLLEGE, a leading school for women, founded at Northampton, Mass., by Miss Sophia Smith. It received a charter in 1871, and class sessions began in 1875. The annual student enrollment is over 2,000, and the faculty numbers about 200. Smith College gives the usual courses leading to the degree of Bachelor of Arts, and confers also on postgraduate students the degree of Master of Arts. The college contributes to the support of the classical schools at Rome and Athens.

Entrance examinations are now required of all students, and systems which fit the training to individual differences and interests have been inaugurated. Selected students are put under the supervision of tutors, and given full play in the development of their personalities and peculiar abilities. Students of French are taken to France during a year of their college work, and allowed to assimilate, at first hand, French accent, manners, and customs. Other plans have been established which are intended to keep alive in the graduates an interest in academic and cultural subjects, and extend the intellectual influence of college training, not only over a period of four years, but for a lifetime.

SMITH-HUGHES ACT, a Federal statute enacted February 23, 1917, to provide Federal aid for vocational education in the public schools, and for the training of teachers for the work. For description, see SCHOOL (Federal Aid). See, also, AGRICULTURAL EDUCATION (Secondary Schools); HOME ECONOMICS (The Schools and the Home).

SMITH-LEVER ACT. See AGRICULTURAL EXTENSION WORK; CANNING CLUBS; COUNTY AGENT.

SMITHSON, JAMES. See SMITHSONIAN IN-STITUTION, subhead.

SMITHSONIAN INSTITUTION, an institution of learning and research in Washington, D. C., founded through the beneficence of James Smithson, an Englishman who had never visited the United States (see subhead, below). This bequest, which amounted to approximately \$550,000, was accepted by the Congress of the United States; and by act of August 10, 1846, the Smithsonian Institution was established with the threefold purpose of increasing knowledge by research, diffusing it through publications, and exchanging results of investigations with other countries. Additional gifts have increased the fund to over \$2,500,000, of which \$1,000,000 is deposited in the United States Treasury, with interest at 6 per cent. The annual income, plus gifts for specific purposes, is about \$248,000—a very meager sum in view of the work undertaken and accomplished, and in comparison with the resources of other endowed academic institutions financing research.

Although the Government accepted the Smithson bequest in trust, the Institution is not a Federal bureau. It is administered by a Board of Regents, made up of the Vice-President and Chief Justice as members ex officio, three Senators, three Representatives, and six citizens, two of whom must be residents of the city of Washington. Board members, other than the ex officio members, are appointed by joint resolution of Congress. The executive officer is a Secretary selected by the Board of Regents, and his office is

not political. All the past secretaries of the Institution have held office until their death. The remainder of the personnel also are selected on their merits. The first secretary, Joseph Henry, outlined a broad and general policy of administration, to which later secretaries have adhered. Henry established the weather service and started exchanges of scientific publications with other nations.

The several bureaus which are under the jurisdiction of the Smithsonian Institution are supported by appropriations of Congress (see descriptions, below). The library of nearly 900,000 volumes, composed chiefly of the publications of other learned societies and scientific periodicals, is housed in the Library of Congress, except for a sizable working library, which is maintained at the Institution. Scientific research, exploration, publication, and the care of collections and exhibits form the bulk of the Smithsonian activities, and these are carried on to the limit of the resources, the intentions of the founder being faithfully followed.

One of the outstanding problems of investigation has been a study of the effect of the variations of solar radiation on the weather (see below, under Astrophysical Observatory). Painstakingly acquired data have been kept at the Smithsonian station set up on Mount Montezuma near Calama, Chile. To supplement and check the results in Chile, other field stations are maintained on Burro Mountain in New Mexico and on Table Mountain in California. The staff at Washington analyzes and publishes the results of the researches.

Libraries and educational institutions are at liberty to call on the Institution for specimens and publications. Each year thousands of inquiries and requests are answered. Objects of national pride and interest are turned over to the Institution. In 1028 Lindbergh's Spirit of Saint Louis was deposited with the Smithsonian. In 1936 Wiley Post's Winnie Mae was acquired. It was also hoped, after the Smithsonian acknowledged in 1942 that the Wright brothers, and not Langley, had been the true pioneers of heavier-than-air flight, that the plane flown at Kitty Hawk, N. C., in 1903 would be returned from England. See Air-CRAFT (Famous Flights); Langley, Samuel P.; LINDBERGH, CHARLES A.; POST, WILEY; and WRIGHT, ORVILLE and WILBUR.

Division of Radiation and Organisms. Administered as a division of the Astrophysical observatory, this research unit is now supported by Government funds, although for twelve years it was maintained through private support. It was organized in 1929 for the purpose of investigating the effects of radiation on plant growth. Intricate and highly accurate apparatus has been developed, and striking new results have been obtained relating to the effect of specific wave lengths of radiation on various factors of plant growth and photosynthesis.

Astrophysical Observatory, Secretary Samuel P. Langley (1834-1906) established this bureau in 1800. and the original Congressional appropriation of \$10,000 annually was later increased to \$30,000. The early investigations of Langley seemed to give definite evidence that the sun's radiations varied and that these variations have a bearing on changes of weather and climate. Accordingly, research on solar radiation is carried on at various stations throughout the world, and important results have been tabulated. These give definite promise of longrange weather forecasting.

Bureau of American Ethnology. This was formally instituted in 1870 with the underlying purpose of preserving American antiquities and the history. culture, habits, customs, and languages of the American aborigines. The reports and bulletins published by this Bureau are invaluable to the student of American Indian life. Major John W. Powell, the first director, carried on extensive investigations in the southwest region, and brought to light important anthropological and ethnological material. Explorations and surveys are under way constantly, and notable discoveries along ethnological lines are reported at frequent intervals.

International Exchange Service. Under Secretary Joseph Henry, in 1850, a system was worked out to distribute the publications of the Institution, which was, in turn, to receive publications of similar nature from countries throughout the world. A conference held at Brussels in 1886 drew up a treaty with various nations, and provided international co-operation in the free exchange of scientific and other publications. Peacetime exchanges with nearly every nation aid immeasurably in the advance of knowledge.

National Gallery of Art. In 1937 Andrew Mellon gave his famous art collection to the Smithsonian Institution. He also provided funds to erect a marble building to house it, to be known as the National Gallery of Art, and to be administered by a board of trustees, of which the secretary of the Smithsonian is a member. The collection comprises a large number of old masters of first rank. In 1939 Samuel H. Kress gave his famous collection of Italian paintings and sculptures.

National Collection of Fine Arts. This bureau of the Smithsonian Institution, formerly known as the National Gallery of Art, is housed in the National Museum. It contains many fine paintings, portraits, and other art works, including the collections of Harriet Lane Johnston, William T. Evans, and Ralph nacedentintrationer in the manual manual company of the company of

Cross Tohnson.

Freer Gallery of Art. This is a separate unit of the National Collection of Fine Arts. It was opened in 1923. Charles L. Freer presented to the United States his collection of rare Japanese, Chinese, and American art, and erected a beautiful building to house and display it. In addition, Mr. Freer bequeathed about \$3,000,000 to be used for the galery, and for further researches and collections of Oriental art.

National Zoological Park. This was established in Washington in 1890, and contains about 2,400 animals of more than 700 species. One of the objects of the establishment is the preservation of certain American animals that are rare and threaten to become extinct. The park occupies 167 acres.

National Museum of the United States. See sep-

arate article under that title.

James Smithson (1765-1829), who founded the Institution, was a son of Sir Hugh Smithson, later Duke

of Northumberland. He was born in France and educated at Oxford, where he showed particular interest in mineralogy and chemistry. He became a member of the Royal Society, and enjoyed considerable reputation as a scientist. He died in Genoa, Italy, but in 1904 his body was brought to Washington, where it now lies in a small mortuary chapel in the main entrance of the Smithsonian building, so that, though he was never in America during his lifetime, his bones rest within the monument his generosity reared.

Related Subjects. See the following biographies of men important in the history of the Smithsonian Institution: Henry, Joseph Powell, John W. Langley, Samuel P.

SMITHSONITE. See ZINC.

SMOCK. See Sewing.

SMOKE, the visible vapor that arises from a burning substance, especially wood, coal, peat, or petroleum. Smoke contains water vapor, carbon dioxide, or some other gases, but the visible portion consists of minute particles of unburned carbon that form the soot. When combustion is perfect, the smoke is nearly invisible. A great volume of black smoke indicates imperfect combustion and a consequent waste of fuel. Soft coal and crude petroleum produce the largest quantities of soot of any fuels, and in large cities where soft coal is the principal fuel, the smoke becomes a nuisance. A scientific investigation of the air about Chicago, which may be taken as a type, showed that the chimneys of that city at that time were throwing out nearly 180,000 tons of solid matter in a year. By far the greater part of this matter was soot.

Several American cities are making systematic efforts to control the smoke evil, a greater part of which is caused by careless stoking and imperfect draft. Automatic stokers, which feed the fire no faster than fuel is consumed, and properly constructed chimneys and flues, are among the best means for preventing smoke. The electrification of steam railroads within city limits is also advocated. It is compulsory in New York City. See Combustion; Soot. T.B.J.

SMOKEBALLS. See Mushrooms.

SMOKELESS POWDER. For five centuries after its introduction into European warfare, in the fourteenth century, gunpowder was the only propellant used for firing projectiles from guns. This is a mechanical mixture of saltpeter (potassium nitrate), sulphur, and charcoal. Since its combustion yields solid products that cause the formation of clouds of smoke and foul the barrel of the gun, chemists experimented for a long time in the effort to find a smokeless and more efficient propellant. No such preparation satisfactory for all kinds of guns was discovered until late in the nineteenth century. Numerous smokeless powders of varying composition, patented under various trade names, are now in wide use for military and sporting purposes. With

the aid of these preparations, projectiles are driven from guns varying in size from a pistol to a long-range gun capable of firing a shell a distance of over seventy miles.

A satisfactory smokeless powder, besides yielding no solids that produce smoke, must be capable of exerting a sustained pressure on the barrel of the gun, but must not explode with too great violence. What is desired is a propellant that drives out the shot with the greatest possible velocity consistent with the lowest possible pressure. Smokeless powders burn inward from the surface in parallel layers, and under proper conditions, the burning is so regulated that the combustion works gradually from a slow start to an increase of pressure and speed that reach their climax when the projectile is discharged from the barrel.

Strictly speaking, smokeless powders are not powders, but the name is retained because they are successors of gunpowder. Practically all of them are made from nitrated cellulose, of which guncotton is the most explosive form. Nitrated cellulose is any form of cellulose cotton, wood, etc.—converted into a product having nitrogen in its composition through the action of nitric acid. Sulphuric acid forms a part of the acid mixture because it removes the water that forms during the reaction. Guncotton has a nitrogen content of thirteen per cent or more. It burns without smoke, but because of its fibrous and porous condition. its combusion is too rapid to make it a safe propellant. A successful smokeless powder was invented when it was discovered that a nitrated cellulose could be changed into a slower-burning jellylike mass, that is, gelatinized, by the action of a solvent. Guncotton is soluble in acetone, acetic ether, and various benzene compounds; the lower nitrates (called nitrocotton, collodion cotton, and pyroxylin) dissolve in ether-alcohol and nitroglycerine.

Smokeless propellants containing nitroglycerine are called nitroglycerine powders; those not containing this chemical are termed nitrocellulose powders. The former have the higher temperature of explosion. Various other ingredients may be incorporated to impart special qualities. Compounds called stabilizers are used in some powders. These react with the products of combustion in such a way as to prevent too rapid decomposition. Diphenylamine, a coal-tar product, is most commonly used for the purpose. Crude vaseline, castor oil, and other fats are sometimes employed as lubricants. Vaseline is also an effective stabilizer. Barium and ammonium nitrates are useful in that they speed up the rate of burning by supplying additional oxygen.

The ingredients are brought together in a mixing machine, in which they are converted into a stiff jelly. The "dough" is afterward placed in a press that forces it through a die,

by which it is shaped into cords, strips, tubes, or other forms desired. These may be further cut or sliced to form flakes, grains, etc. Finally, the pieces are dried by hot air or steam. Their size and shape are important, because the rate of burning is dependent on the time it takes the combustion to travel through the mass. The thicker the cord or tube, the slower the rate of ignition. The pieces are also cut to varying sizes in accordance with the caliber of the gun for which they are designed.

The first smokeless powder suitable for rifles, called *poudre B*, was patented about 1886 by a French engineer named Vieille. He made it by dissolving nitrated cotton in etheralcohol and adding a little picric acid. *Ballistite*, consisting of nitrocotton of low nitration gelatinized with nitroglycerine, was invented by Nobel in 1887, and the same year the British government adopted *cordite*, a mixture of guncotton, nitroglycerine, and vaseline, the solvent being acetone. Among American powders are *Du Pont* and *indurite*.

Related Subjects. The reader is referred in these volumes to the following articles:

Ammunition Cordite Explosives Guncotton Gunpowder Maxim (Hudson Maxim) Nitroglycerine

SMOKE SCREEN. See WORLD WAR I (Submarines in the War: Submarine Losses).

SMOKY MOUNTAINS, GREAT. See North Carolina (The Land).

SMOLLÈTT, TOBIAS GEORGE (1721-1771), a British novelist born near Dumbarton, Scotland. After receiving a grammar school

education, he was sent to the University of Glasgow to study medicine, and was later apprenticed to a surgeon of Glasgow. However, he was more interested in the profession of literature than in that of surgery, and by 1739 had produced a tragedy, The Regicide. Having tried unsuccessfully in London to secure the acceptance of this play, he



TOBIAS SMOLLETT

embarked as surgeon's mate on the *Cumberland*, which was about to join Admiral Vernon's expedition against Cartagena (1741). After his return to London, he left the navy and again attempted literary production.

His Novels. In 1748 appeared the first of Smollett's best-known works, the novel Roderick Random, which is a story based largely upon his experiences at sea. It became immediately popular. Of his later works, the most noteworthy are Peregrine Pickle and

Humphrey Clinker. These novels, as well as Roderick Random, depend for attractiveness upon amusing and thrilling incidents; they are not carefully constructed, and the character portrayal attempted is somewhat superficial. Their author is remembered chiefly for the part he had in the early development of the English novel (see NOVEL).

SMOOT, REED (1862-), United States Senator from Utah for thirty years (1903-1933), and one of the leaders of the Church of Jesus Christ of Latter Day Saints. He was born in Salt Lake City, Utah, and was graduated from Brigham Young Academy at Provo, in 1879. His extensive business and banking interests in Utah are directed from his home in Provo. In 1900 he was made an apostle in the Church of Latter Day Saints.

While United States Senator he served as chairman of the Senate Finance Committee, a member of the World War Foreign Debt Commission, and a regent of the Smithsonian Institution. Senator Smoot acted as chairman of the resolutions committee which drafted the party platform at the Republican National Convention in 1928. He is a rigid believer in economy and efficiency, and an uncompromising advocate of a protective tariff. It was he who instituted the United States Bureau of Efficiency. Tax and tariff problems were his special assignments in the United States Senate, and he was co-author of the Smoot-Hawley tariff law. See Tariff.

SMUGGLING, the practice of taking into a country by stealth dutiable merchandise without paying the tax imposed by tariff laws. All countries which impose duties have stationed at their ports of entry, and at points on the borders of adjoining countries, certain officers whose duty it is to examine personal baggage and shipments of merchandise, to see that goods brought in are not undervalued, and that the regular duties levied against them are paid. Violators of the customs laws are punished by fine, imprisonment, or forfeiture of goods, according to the magnitude of the offense. The term refers also to the practice of bringing into a country an article whose importation is prohibited by law.

In the United States, the act must be done intentionally, and with full knowledge that it is unlawful, to be subject to penalty.

Bootlegging. After the United States, by an amendment to the Constitution, prohibited the manufacture, sale, and transportation of all liquors containing more than one-half of one per cent of alcohol, many persons continued to demand alcoholic beverages. Those who were willing to supply this demand illegally were called bootleggers. This is a term borrowed from the backwoods days when the demoralizing effect of liquor on the Indians caused the early settlers to prohibit its sale, and illegal supplies were smuggled through in

SMUTS

the high boots then worn by the frontiersman. Until the repeal of the Eighteenth Amendment, this form of smuggling developed to a high degree, and involved bribery of officials and rivalries among the leaders of the illicit trade, which resulted in gang wars in the large cities and a general laxity of law enforcement. The Federal government was compelled to take special measures to deal with the situation. The sources of supply, government warehouses, and foreign importation were carefully guarded, and the United States Coast Guard was called into service to prevent private boats called "rum runners" from transporting liquors to shore from foreign ships lying outside United States territorial waters.

Related Subjects. The reader is referred to the following articles in these volumes:

Customs Duties Free Ports Free Trade Port of Entry Revenue-Cutter Service Tariff

SMUTS, minute fungi that live within certain other plants as parasites. Smuts attack wheat, oats, barley, and corn, and cause great damage to crops every year. The black dust, or smut, consists of the millions of spores produced by the fungi. These spores are capable of spreading the disease another season; some few spread the malady immediately. Some of the smuts which attack wheat, oats, and barley are on the seed, having lodged there, and in most cases these spores can be killed by treating the seed before planting. Soaking wheat in a solution of one pound of copper sulphate to a gallon of water for five or six minutes will destroy the spores of wheat smut. Oat smut is destroyed by spreading the seed on a floor and sprinkling it with a solution consisting of one pound (one pint) of formalin to fifty gallons of water. Soaking the seed in hot water is also effective. The temperatures may range from 125° to 135° F.

Since corn smut does not get into the seed, it cannot be prevented by any of the methods already described. The spores lodge in the soil and in manure, and attack the young plants, penetrating the stalk and sending fibers into every branch, leaf, and flower. In this way the fibers get into the ear, where the fungi mature and burst forth just as the farmer thinks he is to have an abundant crop. The smut, which is of a bluish-black color, appears at the tip of the ear, where the kernels swell to several times their normal size and burst, sending the spores into the air to be blown about by the wind. Smut may also appear in the tassel and the leaves.

Corn smut is prevented with difficulty, because the spores may be carried over to the next season in many ways. Masses of smut are left on the ground and remain in the soil. The spores get into the fodder and then into the manure, where, in the spring, spores which

attack the next crop are developed. Rotation of crops is the surest preventive of corn smut, since the spores will not live in the soil over more than one season. Seed from an infected field should not be planted, and all smut-infected ears should be destroyed, if possible, before the spores mature.

B.M.D.

Related Subjects. The reader is referred in these volumes to the following articles:

Bacteria and Bacteriology Fungi Parasite Spore

SMUTS, Jan Christiaan (1870gifted Dutch lawyer, soldier, and statesman who fought with the Boers against Great Britain in the South African War, and later became one of the most trusted leaders of the empire in the Union of South Africa. He was born at Cape Town, was graduated in law at Cambridge, then went to the Transvaal. Before he was thirty years old, he was state attorney to the Transvaal Republic, under the Presidency of "Oom Paul" Kruger. In the war against Britain, Smuts rose to the rank of general, proving himself to be as great a soldier as he had been a lawyer. He was foremost in bringing peace to his country, and when Great Britain gave responsible government to the Transvaal, he rose to heights of statecraft and fame which inspired the London government to give him its unlimited confidence. worked hard for the union of South African colonies, and when such a union was formed, in 1910, he became Minister of the Interior, Mines, and Defense. When the World War began, Smuts organized the military forces of the Union, and with Botha was given command of the expedition ordered to capture German Southwest Africa; the enterprise was admirably carried through. Smuts was soon made chief of the imperial forces in South Africa, and the conquest of German East Africa was undertaken with success

When Premier Lloyd George formed his War Cabinet in England, Smuts went to London as South African representative, and he proved himself so able that he became the only permanent Dominion member of that Cabinet. Aviation and air defense particularly interested him, and he was instrumental in bringing about an Air Ministry. In the later Peace Conference, at Paris, Smuts and General Botha represented South Africa. Botha died soon after their return home, and Smuts became Prime Minister of the South African Union.

As Premier and head of the South African party, General Smuts favored the continuance of the Union of South Africa within the British Empire, but had to meet the growing clamor for independent statehood. Smuts became Premier for the second time in September of 1939, when the Assembly overthrew the antiwar government of Premier Hertzog and voted to stand by Britain.

SMYRNA, smur' nah, or IZMIR, since 1930, a vilayet and city of Turkey, situated on the western coast, on an arm of the Mediterranean Sea. The city lies about 200 miles southwest of Constantinople, with which it is connected by a line of railway, and is built partly on the slopes of Mount Pagus and partly on the plain below.

Smyrna is built on the site of a Greek colony in existence over seven centuries before Christ. The ancient city laid claim (as did several others) to being the birthplace of Homer, and a great temple in his honor was maintained there.

The city was long famed as the center of an Oriental rug trade, and it long enjoyed comparative prosperity. However, the struggles and hostilities for the possession of Smyrna which followed the World War reduced both the prosperity and the population. Italy had been promised Smyrna in 1917 by a secret agreement which was never ratified. Venizelos, a Greek statesman who had been anxious from the beginning of the war to have Greece enter on the side of the Allies, had his eye on the Smyrna territory for Greece. He represented his country at the Peace Conference, and during the period when the Italian delegates had retired because of disagreements, he succeeded in having Smyrna awarded to Greece on terms of temporary occupation. As soon as the Greek troops landed, about May, 1919, atrocities began, from which Turkish inhabitants suffered most.

In August, 1920, the Treaty of Sèvres confirmed Greek occupation, and put the Smyrna area and the Ionian hinterland under Greek sovereignty for five years, at the end of which time Greece might incorporate the territory outright, or hold a plebiscite as a matter of formality. The boundaries, as set off by the treaty, were not identical with the autonomous Smyrnean area which Venizelos had in mind, but, having been revised to suit Italy and France, the lines ignored natural frontiers, cut across railways, and showed utter disregard for geographic or economic unity. These conditions were responsible for the failure of the arrangement. The population was not predominantly Greek, as Venizelos had claimed, and among the merchants and industrialists were many other nationals, as well as Greeks.

For the first two years, Greece was successful in hostilities against the Turks, though its conduct caused it the loss of the good will of Great Britain. The London Conference of 1921 attempted to deal with the situation by suggesting allied military interference, but the subject was dropped. By 1922, Greek success began to wane, and the Paris Conference proposed that the area be given to Turkey. Though an agreement was not reached at this time, it was the signal for many Greeks to

leave Smyrna, while the Turks entered. In September, 1922, three days after the arrival of the Turks, a great fire broke out, which destroyed nearly three-fifths of the city, only the Turkish area escaping. Thousands of lives were lost, there was great property damage, and the city received a setback from which it will take many years to recover. Whether the Greeks or the Turks started the conflagration is not known, but it marked the climax of about four years of atrocities in which both sides were implicated, and which left Europe with perhaps less sympathy for the Greeks than for the Turks. The Lausanne Treaty of 1923 restored Smyrna to Turkey.

Mustapha Kemal, Turkish soldier, statesman, and first President of the Turkish republic, realized that lack of a knowledge of economics, as well as shiftlessness, dishonesty, and indolence, were defeating progress and development in Turkey. In 1923 he called an economic congress at Smyrna, and issued an Economic Pact setting forth Turkish sins and omissions and suggesting reforms. Efforts are being made to revive the carpet-weaving and textile industry in Smyrna. The carpet industry is operating at about 60 per cent of the pre-war capacity, and cotton ginneries are gradually being rebuilt; flour milling is also on the increase. Smyrna has good rail-road connections, and it remains the second port in Turkey.

As in other Near East countries, airports and airplane communications are being established in the vilayet. Population, 184,362 (1940); of the vilayet, 597,812.

Related Subjects. The reader is referred in these volumes to the following articles:

Greece Sèvres Treaty of Kemal, Mustapha Turkey Lausanne, Treaty of Venizelos

SMYTH, ETHEL MARY (1858-), English composer, born in London. She received her musical education in Leipzig, and her early compositions were performed there and elsewhere on the continent. A Mass in D, presented in London in 1893, attracted attention to her ability, and her reputation was assured after the appearance of her first opera, Fantasio, in 1898. Later operatic works were Der Wald and The Wreckers, and in the field of comic opera, The Boatswain's Mate. Other compositions include chamber and orchestral music, songs, and choruses. Her song *The March of the Women* was written in the cause of the suffragists, in which she took an active interest and part. In 1922 she received the honor of being made a Dame Commander Order of the British Empire.

SNAIL, snayl, a mollusk inhabiting both land and water, and distinguished by having a spirally coiled shell attached to the soft body (see Mollusks). A snail, when it desires

SNAIL

INTERESTING INFORMATION ABOUT SNAILS

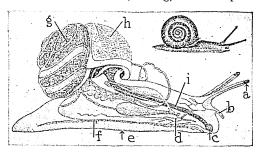
At left, a snail photographed on a concrete sidewalk, showing the slimy trail it leaves behind; a snail on a leaf. At right, the palate of a garden snail, as seen under a microscope.

protection or wishes to go into winter quarters, withdraws the entire body into the shell, as the attaching membrane is a muscular process. This shell, which consists of but one valve, is often called the "house of the snail." It is secreted by the skin of the animal, and is composed of a limy substance. At first the shell is soft and pliable, but it becomes harder as the animal grows to maturity. Charles Lamb once wrote:

The frugal snail, with forecast of repose, Carries his house with him where'er he goes.

Snails move so deliberately that the expression "slow as a snail" has become proverbial. It has been estimated that one kind of snail could cover about half a mile in a week.

The typical land snails are found in warm, damp places in fields and woodlands; they especially like a situation under a fallen log or in a mossy tree stump. Their organ of locomotion is a so-called foot, a long, muscular pro-



PARTS OF A SNAIL

(a) Eye; (b) tentacle; (c) mouth; (d) nerve ganglia; (e) foot; (f) mucous gland; (g) liver; (h) lung; (i) oesophagus. The upper illustration shows the snail in its natural position.

jection extending from the shell. By contractions of this organ, the snail slowly crawls along, its progress being aided by the excretion of a slimy mucus. One of these creatures can be trailed by the slimy track it leaves behind it. On the forward end of the foot is a head bearing two pairs of tentacles, or horns, and on the upper pair of tentacles are the tiny, black eyes, capable of seeing in all directions. The lower pair of horns constitute the organs of touch. The mouth is provided with a peculiar, ribbonlike tongue, which is covered with numerous tiny, hard teeth. Though snails are fond of leaves and other vegetable matter, some are flesh-eaters.

Snails are used as food in many places in Southern Europe, and snail farms, or snaileries, are common in France, Spain, and Italy. In France, snail flesh is a standard delicacy of the menu; it is estimated that the people of Paris alone consume about 200,000,000 snails a season. Though snail culture began near Rome about 50 B.C., it was not introduced into France until the latter part of the eighteenth century. Now the snaileries not only supply the local demand, but have a surplus for export to the United States. In the snaileries, the animals are fed vegetables, fruits, bran mash, and herbs. They reproduce chiefly by laying eggs, although with a few species, the young are born alive. Some are hermaphroditic, but even with these, cross-fertilization is necessary. The flesh of snails resembles that of oysters in flavor.

Water snails live in both fresh and salt water. Some of them breathe air through an opening on the back into the lung cavity; others breathe in the water by means of gills which resemble those of the oyster. There are many varieties of water snails, and they are found in all parts of the world. Fresh-



LAND-SNAIL SHELLS

(a) Common Philippine variety; (b) colored shell from Florida; (c) the most common shell found in

water snails are more numerous in the temperate zones. S.H.S.

Classification. Snails belong to the class of mollusks known as gastropods (see Gastropod). The larger and most numerous snails are found in the family Helicidae. The species commonly eaten in Europe is Helix pomatia.

SNAKE. Living on and under the ground, in fresh and in salt water, and in trees, more than 1,500 species of snakes are found in nearly all parts of the world, with the exception of Polar regions and most oceanic islands. There are no snakes in New Zealand, the Hawaiian Islands, the Azores, or Ireland. In the tropics these reptiles are found in greater numbers than anywhere else, and here, too, they attain the largest size. The giant anacondas of South America grow to be thirty feet in length, but there are very small species not over five inches long, and all degrees of size in between. Snakes form the largest division of the reptiles, in which they are grouped with certain other cold-blooded vertebrates—the lizards, turtles, tortoises, alligators, and crocodiles.

Characteristics of Snakes. A snake, wherever found, may be recognized by the slender wormlike body that wriggles along by means of certain movements of the ribs. The snake has to get a "purchase" on the place over which it crawls, and cannot make any headway on a perfectly smooth surface. With the exception of a few species having primitive hind legs, snakes are wholly legless. The body is regularly cylindrical, and has no distinct divisions of head, trunk, and tail. Contrary to the belief of many, it is not slimy, but is covered with dry scales, which are folds in the skin. There are no external ears and no eye-The portion of the ear with which the snake detects sound is covered by skin and scales. In fact, some species, as the rattle-snakes, are practically deaf. The eyes are protected by a transparent cap that is shed with the skin. Like the Evil One, of which it is the symbol, the snake sleeps with its eyes open. The tongue is long, slender, and forked. It is the animal's best organ of touch, and is continually thrust out when it wishes to

ascertain its whereabouts. The teeth, which curve backward, are sharp and pointed, and are used in seizing food but not for chewing, as the prey is swallowed whole. Poisonous species have, in addition to the ordinary teeth, perforated fangs in the upper jaw, through which the poison fluid passes from glands at Snakes can swallow creatures their base. much larger than themselves, as the lower and upper jaws are hinged together in such a manner that the mouth can be widely extended. In addition, the halves of the lower jaw are connected in front by an elastic band, and each side can be pushed forward independently. As a rule, the prey is swallowed alive, but the huge pythons and boas first kill their victims by crushing them.

According to their modes of life, snakes may be divided into burrowing, ground, tree, freshwater, and sea snakes. The poisonous species are found on the ground, in trees, and in the sea. Animal life is the chief food of snakes, but a few species eat eggs. Some snakes lay eggs, and the young are hatched outside the mother; others bring forth their young alive.

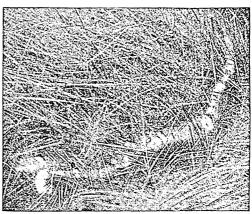


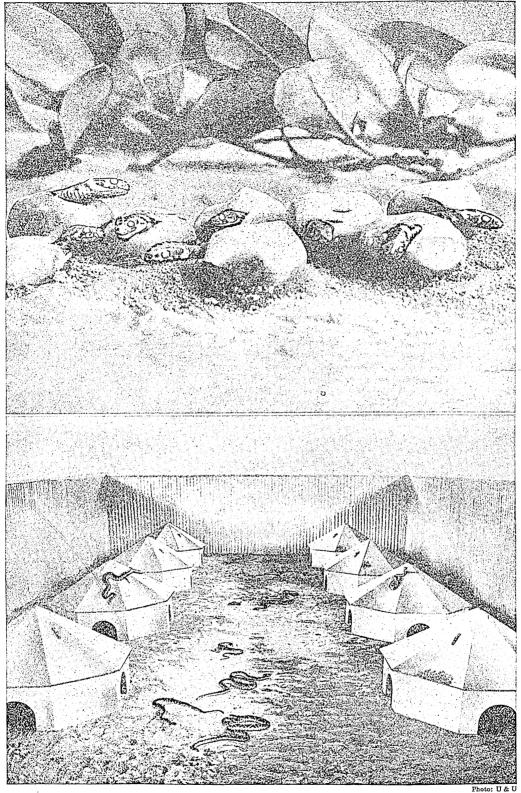
Photo: Visual Education Servi

A MOLTED SNAKE SKIN

It is not unusual to find very perfect skins in rocky or bushy places, for the snake is in the habit of molting the skin several times a year (see MOLTING).

Economic Value of Snakes. Snakes are too often regarded with fear and repulsion, when they should be considered friends of mankind. With a few exceptions, snakes are harmless, and even the venomous species do not usually attack human beings deliberately. On the other hand, snakes kill large numbers of rats, mice, and other crop-destroying rodents, thereby rendering valuable service to the farmer. It has been estimated that one snake will eat, in six months, nearly 150 mice.

How to Recognize Venomous Snakes. The poisonous snakes in the United States belong to four groups—the coral snakes, the rattle-



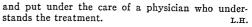
Neither Lovely nor Attractive. Grass snakes hatching from eggs [photographed in the London (England) zoo]. Below, scene on a Honduras snake farm; here venomous reptiles are raised for the purpose of extracting their poison for use in serums to protect men against their bites.

snakes, the water moccasins, and the copperheads. The coral snakes, which are among the most poisonous, are found only in a small area in the South, and may be recognized by their markings of conspicuous reddish bands. The other three varieties belong to the subfamily of pit vipers, and may be known by the characteristic pit between eye and nostril. A venomous snake, too, has a body thick in proportion to its length, a triangular head which may be distinguished from the neck, and elliptical, catlike eye pupils, rather than round ones.

Snake Bite. Cases of poisonous snake bite will usually yield to the following remedies:

r. Place a tourniquet around the limb above the wound, to keep the venom from flooding the system. This should be relieved slightly at approximately one-hour intervals, in order that the blood in the injured member may be refreshed, and that the venom may very gradually be eliminated from the system.

2. Cut into the marks made by the fangs, with a razor or any other sharp instrument, as the resulting bleeding will help wash out the poison. Better, cut out the tissue for an



Scientific Names. Snakes belong to the class Reptilia, order Squamata, suborder Ophidia. Authorities differ considerably as to their grouping into families, but the most important of those generally recognized are the following: Boidae, including the boas, anacondas, and pythons; the Colubridae, comprising ninety per cent of the living species; and the Viperidae, including the subfamilies Viperinae (true vipers) and Crotalinae (pit vipers).

Related Subjects. The reader is referred to the articles listed below:



A SERPENT CHARMER OF INDIA

inch around the fang marks. If this is not practicable, sear the wound with a red-hot iron.

3. The wound may be sucked and the venom spat out, but such a procedure is dangerous if there is a scratch or sore on the lips or gums.

4. Rub into the wound some crystals of potassium permanganate, or, better, inject with a hypodermic syringe a solution of the permanganate with boiling water. Iodine applied in and about the wound and taken internally is recommended for rattlesnake bite.

5. In case of collapse, the patient may be stimulated with strong, hot coffee, or aromatic spirits of ammonia, half a teaspoonful being given half-hourly in cold water. Under no circumstances should whisky be given. It is not an antidote for snake bite, and is usually distinctly harmful to the patient.

6. Remember that many hospitals, and all museums which contain venomous snakes, have a supply of the snake serum at hand. This is the surest remedy for the venom of the snake; therefore, if possible, the patient should be taken immediately to a hospital Adder
Anaconda
Asp
Blacksnake
Boa
Cobra
Copperhead
Garter Snake

Glass Snake Milk Snake Moccasin Snake Python Rattlesnake Reptiles Snake Charming Viper taran oleh dirikan diri

SNAKE BIRD, a name applied to the darter and to the wryneck (both of which see).

SNAKE CHARMING, an ancient art in Egypt and the East, the practice of which, as a means of entertainment, is usually passed from father to son. It is mentioned in the Old Testament and by many classical writers. Occasionally, the serpent charmers cut out the poison fangs of their snakes, to render them harmless, but the custom is not general. The secret of snake charming, with minimum danger, seems to be the possession of confidence

and knowledge of the reptiles' habits. Snakes are fond of music, and the usual way of controlling them is by playing a flutelike pipe. The serpent, resting on the coils of its lower body, will sway the upper part from side to side. Asps have no external ears, so music cannot influence them; regular, rhythmical motion will produce the desired effect, however, and the serpent charmer waves his pipe back and forth. Even professional charmers play tricks only with the safer, hooded varieties.

SNAKE DANCE, a weird ceremonial dance of the Arizona Hopi Indians, in which the dancers, who are members of the Antelope and the Snake priesthoods, carry live snakes in their mouths. Rattlesnakes are principally used, but the reptiles are handled so carefully that the dancers are rarely bitten. After the ceremonial, the entire village indulges in a feast. The snake dance is held every two years, in August, and is a plea to the powers of nature to send rain.

[Efforts have been made to have the United States government prohibit the snake dance, but the wishes of the Indians continue to be respected.]

SNAKE INDIANS. See Indians, American (Most Important Tribes: Shoshoni).

SNAKE KILLER. See ROAD RUNNER SNAKE RIVER, the largest tributary of the Columbia River. It furnishes an abundance of water power and is largely drawn upon for irrigation purposes. Rising high in the Rocky Mountains of Yellowstone Park, the Snake flows in a southwesterly direction to the southern part of Idaho, turns westward, flows across the state nearly to the Oregon line, and then swings abruptly northward. For 170 miles it forms the boundary between Idaho and Oregon, and for about thirty miles flows between Washington and Idaho. At Lewiston it turns westward into Washington, where it joins the Columbia River, near Pasco. Though the stream is over 900 miles long, its many falls and rapids render it useless for navigation except between the mouth and Lewiston, a distance of 100 miles. The Indians called the river Shoshone, a name which is now given to a cataract at the Idaho-Wyoming boundary.

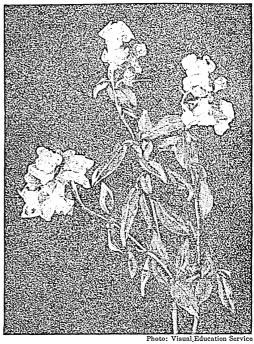
SNAKEROOT, the name applied to a large number of plants, because their roots resemble snakes, or for the reason that they were at one time believed to cure snake bites. They are found quite generally throughout the United States and in many parts of Canada, and their roots in many instances have medicinal value. Black snakeroot, or cohosh, yields a drug used in treating Saint Vitus's dance; the roots of Virginia snakeroot, or birthwort, have tonic properties and have been used to cure rattlesnake bites. As a remedy for the latter, however, they have no real value. Another species, Canada snakeroot, or wild ginger, has

stimulating properties and is also used as a spice. From Senega snakeroot an emetic is prepared.

B.M.D.

Scientific Names. Black snakeroot is classed as Cimicifuga racemosa; Virginia snakeroot is Aristolochia serpentaria; Canada snakeroot, Asarum canadense; Senega snakeroot, Polygala senega.

SNAPDRAGON, any one of a genus of herbs whose blossoms, when pressed open and then released, fly shut with a gentle snap. Each



SNAPDRAGON

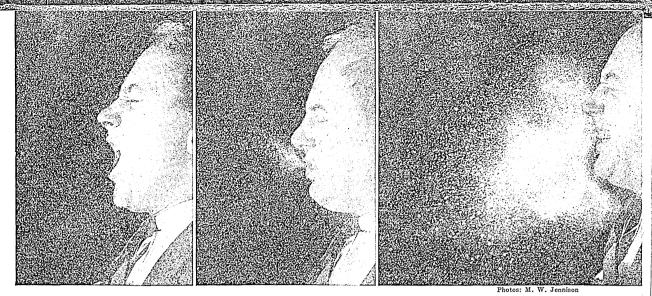
flower consists of a tube, at the end of which are two closed lips. When the flower is pressed open, it is these lips that snap together. The flowering stalks of the most commonly cultivated species, a native of Europe, grace all old-fashioned gardens and make ornamental borders for large flower beds. The velvety texture and the beautiful and varied colors give the blossoms great charm. The stalks, growing three feet high or more, are covered with fine, short hairs, and the small, smooth leaves are somewhat thickened. The common snapdragon lives from year to year, but some species must be grown from seeds each spring.

B.M.D.

Scientific Name. The snapdragons belong to the family Scrophulariaceae. The common snapdragon is Antirrhinum majus.

SNAP JUDGMENT. See REASON, OR REASONING.

SNEEZING is caused by irritation of the sensory nerves of the nose. The act itself is a



HOW SNEEZING SPREADS DISEASE

A single sneeze, the stages of which are shown in the high-speed photographs above, may scatter as many as 46,000 tiny, bacteria-laden droplets into the air. Traveling as fast as 150 feet per second (more than one hundred miles an hour) and as far as twelve feet, the droplets evaporate quickly, leaving behind nuclei so tiny that they may float in the air for days. Believed to carry the germs which cause colds, influenza, and similar diseases, they are considered a menace to health. Sneezing into a handkerchief prevents most of the droplets from escaping into the air.

sudden and violent expiration chiefly or wholly through the nose. It is an example of reflex action, and is a spontaneous effort on the part of the body to remove the irritating agent.

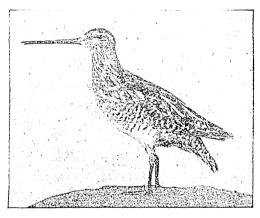
Ordinary cold in the head is usually accompanied by sneezing, and continued and violent attacks are characteristic of hay fever, asthma, and whooping cough, and severe cases of nasal catarrh. Dust, pollen, tobacco smoke, and other outside irritants may cause sneezing. Local applications of menthol or a similar drug to the mucous membranes of the nose will usually allay severe sneezing.

K.A.E.

SNIPE, the name of a group of shore birds related to the sandpipers, curlews, and certain other water fowl. The one species found in North America is the Wilson's snipe. It is acrobatic in the air, and has a strange habit of "bleating" or "drumming," a sound that it produces by mounting to a great height and then descending by one quick swoop after another, with the air rushing through its wings. Its summer range is from the northern United States to Hudson Bay and Labrador, and it winters from Illinois and South Carolina southward. The snipe is more timid than the sandpiper about being seen in the open by day. Its nest is a depression in the ground on the edge of marshes. The eggs are four in number, and their color is olive-brown or grayish-drab, thickly spotted with chocolate. The bird is The eggs are four in number, and about eleven inches long, and has a short tail and a very long bill; a flexible, sensitive tip on the latter is used skilfully in probing for worms

Scientific Names. Snipes belong to the family Scolopacidae. The Wilson's snipe is Capella delicata; the European common snipe, Gallinago.

SNO QUALMIE, sno kwol'mih, RIVER. See WASHINGTON (state).



THE SNIPE

SNORING. The sounds of snoring vary from a heavy breath to the loud reverberations which sound like the word itself. Snoring may occur with mouth open or closed. The sounds come from vibrations of the relaxed soft palate and uvula caused by the passage of the air in breathing. The open mouth allows the membranes to dry out, snoring grows worse, and the snorer Inflammations may awake with a sore throat. or obstructions in the nose and throat, such as adenoids, growths, bent nasal septum (partition), or broken nose poorly set tend to produce or aggravate snoring. These require treatment. Removal of adenoids, straightening of the nasal partition or septum, or the removal of growths in the nose may help. Great fatigue, deep sleep, and lying on the back or throwing the head back often make snoring worse. Bandages under the chin, and mechanical devices to waken the sleeper when he rolls on his back are usually unsuccessful. w.w.b.

SNORRI STURLUSON, snor' re stoor' loosun (1179-1241), one of the earliest historians of Iceland, famed as the author of the Prose Edda (see Edda) and of a series of biographies of old Norwegian kings entitled Heimskringla. The Prose Edda, completed in 1222, is one of the first masterpieces of Scandinavian litera-

ture, but was not published until the seventeenth century. Snorri early became prominent as a poet, lawyer, and statesman, and in 1215 was made president of the legislative assem-bly and higher court of Iceland. In 1218 he visited Norway on the invitation of King Haakon, and when he returned home, he became a vassal of the Norwegian king and negotiated a peace treaty between Ice- A Russian invention, capable of a speed of about seventy-five land and Norway.

After many years, he lost the confidence of Haakon, and was put to death by the latter's order.

SNOW, sno, crystals of ice formed when cloud vapor is condensed at a point below freezing (32° F.). These crystals do not always reach the earth in the form of snow, for sometimes they are partially melted and reach the earth as sleet, and sometimes they are entirely melted and descend as rain. There are millions of boys and girls in the world who never saw a snowflake, for on over a third of the earth's surface snow never falls. Even in some portions of the United States, there are children who do not know what snow looks like, who never see it-

> "Flying through the cloudy sea Out of soft gray mystery, Lightly, lightly resting, On the old elm nesting, Hanging from the hemlock there Like a beard of silver hair, Molding on the lilac-tree Petals of white purity, Changing to a lovely frieze Ancient weeds forlorn and gray, Shivering along the way.'

Snow forms in six-rayed ice crystals of different designs, some of which are shown in the illustration, page 6665. It is interesting to collect some of them on a black surface and to study them under an ordinary magnifying glass. The white color of snow is due to the reflection of light by the tiny facets of the crystals. In Greenland and a few other places, red and green snow has been known to fall. Tiny organisms living in the snow cause the coloration. Snowflakes are combinations of crystal fragments, and have been known to reach a diameter of as much as four inches.

In Polar regions and on the tops of high mountains, winter months. The heaviest snowmountains of the cool temperate re-Alps, the Rocky range in California. These heavy snow-

snow falls in all seasons, whereas in temperate regions it falls during the falls occur in the gions, such as the Mountains, and the Sierra Nevada falls have always Photo: U&U been a grave danger to persons journeying through the mountain

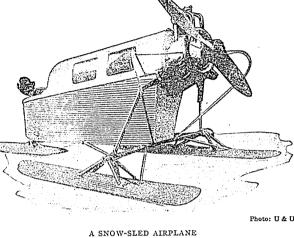
miles per hour. passes, and in Europe houses of refuge are maintained for the sake of protecting such travelers. The most famous refuge is that in the Alps at the Saint Bernard Pass. Even twentieth-century travelers, on swift and luxurious trains, are endangered by the winter snows, the snowslides, and the avalanches which occur in mountainous regions. Railroads protect their tracks by constructing great wooden snowsheds at danger points, but powerful snowplows often have to be used to keep the lines open.

The amount of water in snow is much less than in rain, a rainfall of one inch being equal to a snowfall of about ten inches. Since the melting of snow on mountains supplies water for streams, hydroelectric-power plants, and irrigation reservoirs, mountain snow is of great economic importance.

Related Subjects. The following articles in these volumes will be of interest in this connection:

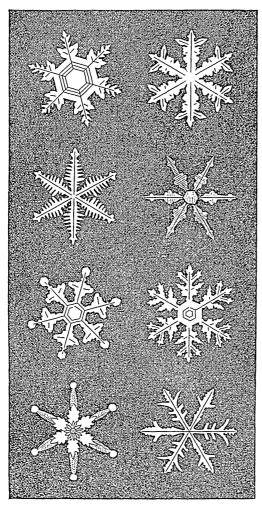
Avalanche Freezing Tce Snowplow Snow Line Crystallization Glacier Snowshoe

SNOWBALL, OR GUELDER-ROSE, gel'dur roze, a handsome flowering shrub of the honeysuckle family that is often seen in parks and on lawns. It is a cultivated form of highbush cranberry and grows from seven to twelve feet high. The first and more common name refers to the large, ball-like, white flowers. which grow in great profusion and bloom in June and July. The term guelder-rose is derived from the name of the Dutch province of



6664

Guelderland, where the plant is supposed to have originated. The flowers of the cultivated plant are all sterile, that is, do not produce



"THE BEAUTIFUL SNOW"

The term is not the fanciful expression of the poet, for nothing exceeds the beauty and symmetry of the feathery flakes. In the illustration the forms are greatly magnified.

fruit, but there is a wild guelder-rose that bears juicy, red berries.

B.M.D.

Classification. The botanical name of the snowball is $\it Vibernum\ Opulus\ sterile.$

SNOW BIRD. See Bunting; Junco.

SNOWBOUND. See AMERICAN LITERATURE (New England Writers); WHITTIER, J. G.

SNOW BUNTING, OR SNOWFLAKE, a sparrowlike bird which may be distinguished from all other North American birds by the large amount of white in its plumage. Not only on its body, but on its wings and tail as well, white predominates. Except in unusually

cold winters, when the snowfall is very heavy, these birds do not venture as far south as the Northern United States, but in Canada they are among the most familiar of winter visitors. Their summers are spent in the Arctic regions. Ernest Thompson Seton says of this bird:

In midwinter, in the far north, when the thermometer showed thirty degrees below zero and the chill blizzard was blowing on the plains, I have seen this brave little bird gleefully chasing his fellows, and pouring out as he flew his sweet, voluble song with as much spirit as ever skylark has in the sunniest days of June.

Snow buntings feed on weed seeds and insect life. They are harmless and deserve protection. See Bunting.

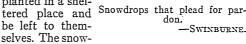
D.L.

Scientific Name. The snow bunting belongs to the family Fringillidae. It is classed as Passerina nivalis.

SNOWDEN, PHILIP. See WAR DEBTS. SNOWDON, MOUNT. See WALES (The Land).

SNOWDROP, any one of a genus of flowering plants of the amaryllis family, so named because they bear delicate white blossoms that seem to be made out of snow. The common snowdrop of the gardens is one of the hardiest

of the out-of-door plants, for it has been known to bloom in midwinter in localities where a warm spell has caused the surface of the ground to thaw. The snowdrop grows from a small, bulbous root, from which spring two or three narrow green leaves and a leafless flower stalk. The nodding, bell-shaped flowers grow singly at the top of the stalk, and usually come into blossqm in northern climes in March or April. The plant is easily cultivated, for the bulbs can be planted in a shel-



drop needs little attention. In England the people call it the Fair Maid of February.

See AMARYLLIS FAMILY.

B.M.D.



03

Scientific Name. The botanical name of the common snowdrop is Galanthus nivalis. The family is Amaryllidaceae.

SNOWFLAKE (bird). See Snow Bunting.

SNOW GUM. See EUCALYPTUS. SNOW LEOPARD. See OUNCE.

SNOW LINE. Even in the Torrid Zone, mountains rise into air that is so cold that snow lies on their upper slopes all the year. The lower edge of these permanent snow fields, in whatever country or zone, is called the *snow* line. The line is affected by prevailing winds, temperature, and moisture, and varies in the same locality from year to year. It is about three miles above sea level in the tropics, about two miles in the Rockies, approximately a mile and two-thirds in the Alps, a little more than a mile in South Chile, and less than a half mile in Greenland. It descends to sea level in the Frigid Zone, where permanent snow may be found even on the lowlands.

Related Subjects. The reader is referred in these volumes to the following articles:

Mountain Climate Irrigation

SNOWPLOW, a machine for clearing the snow from railways and roads. In the United States and Canada, where the snowdrifts are of great depth and liable to be packed hard by violent winds, the railroads are usually cleared by a rotary plow, which consists of a wheel nine feet in diameter and provided with a series of knives or scoops. The wheel is kept revolving by a special engine, which is placed with the plow in front of a locomotive. The scoops feed the snow into a hopper, from which it is blown to a considerable distance by a powerful fan. With a rotary plow the deepest drifts can usually be penetrated.

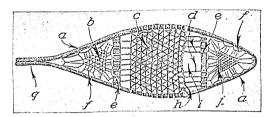
Where the snow is not so deep, a triangular plow, with its apex in the center of the track, is used. Pushed forward by a locomotive, the triangle forces the snow off the track at each side. The triangular plow is also used for clearing roads and sidewalks, but cannot be used in

any great depth of snow.

The clearing of the railroads of the United States and Canada from snow annually costs many thousands of dollars, but so efficient have modern snowplows proved that drifts that would formerly have entirely suspended traffic can now be cut through with comparative ease.

SNOWSHOE, a contrivance to aid in walking on snow, consisting of a light wooden frame, bent in an elongated oval, across which is stretched a web made of deerskin thongs, strung much like a tennis racket. The snowshoe is provided with supports and holders for the feet. The principle applied is that of distributing the weight of the body over a considerable area, thus enabling the yielding surface of the snow to support it. Such shoes are used by hunters, trappers, loggers, and farmers in countries where the snowfall is deep.

In addition to these practical uses, in the principal cities and towns of Canada there are uniformed clubs whose members find snowshoeing a means of recreation for the long winter evenings. The styles of shoes vary according to the use to be made of them, and the surface features of the country where used. A nearly round form is known as the Montagnais, or



PARTS OF A SNOWSHOE (a, a) Frame, or bow; (b) heel filling; (c) center filling;
(d) toe stays; (e, e) crossbars; (f, f) lanyard; (g) tail;
(h) toe cord; (i) toe hole; (j) toe filling.

mountain shoe. Long and narrow shoes are

known as the Klondike; there are all forms between the two. The snowshoe as used in the United States and Canada was originated by the Indians, and

the most expert users of them to-day are the trappers of Eastern Canada. A novice will find it hard to walk even at a slow pace when wearing snowshoes, but expert trappers will walk for hours at a rate of five or six miles an hour on a good, hard-surfaced snow, and many will run at a "dogtrot," covering easily thirty-five or forty miles a day. The wearing of snowshoes makes it possible, and easy, to walk across snow-covered areas in which one without them would sink to a depth of five or six feet, a depth by no means uncommon in the woods of Canada.

SNOWY RANGE, a term sometimes applied to the Sierra Nevada Mountains. See CALI-FORNIA (Surface Features); SIERRA NEVADA.

SNUFF, a fine powder made from the stems and leaves of the tobacco plant, which have been fermented by heat and moisture, then dried and ground. Snuff is inhaled through the nostrils or rubbed on the gums. Various mixtures of flavors or scents are added to make the powder pleasant for inhaling. Formerly, it was considered a matter of etiquette to offer "a pinch of snuff" to friends whom one met, for each person carried a snuffbox. This practice is still prevalent in Southern Europe.

The habit of taking snuff is very injurious. One of its effects is irritation of the nerves of smell and deterioration of ability to distinguish odors. See SMELL.

SNYDER, FRANKLIN BLISS (1884-American educator born at Middletown, Conn. Having served at Northwestern University (which see) as a professor of English after 1918, as dean of the Graduate School from 1934 to 1937, and as vice-president and dean of faculties after 1937, he became president in 1939.

SOAP, a manufactured product which is an indispensable aid to cleanliness. Its ingredients are very largely fats and oils, including tallow, lard oil, palm oil, olive oil, cottonseed oil, coconut oil, corn oil, stearin, and crude oleic acid. In its manufacture a few commonplace chemical ingredients become important. are concerned in this article with household soaps only, without reference to certain special requirements, such as are demanded in the fine arts and in pharmacies. Two varieties are commonly known—hard soap and soft soap. That which contains a potassium treatment in the making is soft soap; the hard variety is a sodium compound.

Soap-making to-day is a scientific development of the methods once employed in homes for the making of soft soap, when our greatgrandmothers saved all greasy substances from their kitchens, to be boiled down and treated with lye which they distilled from wood ashes. Their soap was yellow, because of the potash in the lye. The housewife knew how to continue the process and produce hard soap, by using brine, which is salt in solution. potassium in the soft soap was thus replaced by the sodium in the brine; the part that was soap rose to the top of the receptacle—a large iron kettle over a fire in the backyard-and when it cooled, it solidified. Soap is yet made in the above manner in isolated sections of

many countries.

Soap Manufacture. Rosin, or laundry, soaps are made from tallow, which may be mixed with grease or oil. In the course of the manufacturing process, rosin is added to give the soap its characteristic yellow color. The fatty material, known technically as stock, is poured in a liquid state into a sheet-iron kettle heated by steam coils. During the heating process, lye is added to the mixture from time to time, and when the contents have the appearance of a thick gum, saturated salt solution is added until the soap floats on the surface. The mixture is then cooled, and in this process the brine sinks to the bottom of the kettle. The brine is then drawn off and worked for glycerine and salt, while to the soapy layer fresh, strong lye and rosin are added. The resulting mixture is heated until the rosin is thoroughly united with the soap. Then a salt solution is added as before; the lye is drawn off; fresh, strong lye added; and the mass boiled again. After further cooling, settling, and reheating, and the addition of cold water, the contents of the kettle are allowed to cool off slowly to a temperature of about 65° C.

The soap is next run into a horizontal revolving cylinder known as the *crutcher*, in which it is stirred until the mixture is of a uniform color and texture. Various chemicals, such as

carbonate of soda, are added to improve the quality. Finally, the mixture is run into molds, where it is allowed to harden into huge cakes. These are cut into bars by steel wires and wrapped by machinery for the market. Some machines will wrap about 100,000 bars a day.

Toilet soaps require several other processes, but the crutching operation is omitted. These soaps are usually scented with various ingredients, and they also have different coloring matters added. Cheap, highly scented soaps should be avoided, as the perfume is often added to disguise the presence of offensive fats. As a general rule, a healthy skin is best served by the use of a soap made from pure oil and

good soda.

Some so-called medicated soaps advertised in the markets are frauds, and the advice of a reliable physician should be sought if one is tempted to try a soap for a skin disorder. Transparent soaps contain alcohol and glycerine, and floating soaps are usually a mixture of tallow and coconut oil, potash, and soda. Sailors use what is known as salt-water soap, made from coconut oil, potash, soda lye, and salt. The popular Castile soap is made from olive oil and soda or mixed potash. The so-called naphtha soaps usually contain kerosene.

Glycerine (which see) is an important by-

product of this industry.

See also PIONEER LIFE (How Soap was Made). Before Soap Was Known. In the centuries before the Christian Era, people "bathed" by anointing their bodies with olive oil, and then for cleansing used fuller's earth and plant ashes. Just when soap was first made is not known; the Germans claim that it was made in their country in the first or second century B.C., but the most authentic accounts place its first use in the first century A.D.

Soap Bubble. If air is blown into a film of soap solution, bubbles are formed. The water which forms the surface of the bubble is composed of molecules which exert toward each other a force of attraction. This is called surface tension. The pulling power of the molecules makes it possible to stretch the film until the surface tension will no longer hold the

bubble together.

Surface tension exerts a pressure on the air within. Since it presses equally in all directions, the bubble assumes a round form. When bubbles are blown by air from the lungs, this air is warmer than the surrounding air. Hence, it tends to rise; just as hot air will cause a balloon to rise. As soon as the air cools, the bubble will fall.

The colors seen in soap bubbles are due to the interference of the light waves reflected from the two surfaces (inner and outer).

SOAPSTONE. See STEATITE.

SOCCER, sok' ur. See FOOTBALL (Association Football).

SOCIALISM, so' shal iz'm, a political world movement which seeks to adjust the relation of the individual to the community by means of collective ownership and management of the means of production and distribution. word has been much abused, having been used to describe anarchism, communism, and in fact almost any movement of a revolutionary nature in the political world. But socialism as commonly understood means merely state ownership and management of the means of production and distribution.

The term socialism was first employed in its modern sense in England in 1827, being used in the Owenite Magazine to denote tendencies opposed to liberal individualism. few years later, it was used in both England and France to describe the social ideals of Owen, Saint-Simon, and Fourier.

It was in Germany, however, that socialism first acquired political significance. Marx, whose Das Kapital has been characterized as the socialists' bible, developed, as the result of elaborate research, a set of economic theories which revolutionized existing ideas regarding the relations of the various classes in society. In 1847 Marx and Friedrich Engels published the Communist Manifesto, which explained scientific socialism in language intelligible to the laborer. The Manifesto was written as propaganda to arouse a people not accustomed to political power, and to make them class-conscious.

Fourteen years later, Ferdinand Lassalle, a disciple of Marx, incorporated the Marxian principle into the program of a political group in Germany, called the Social Democratic party. There the movement gained ground rapidly, perhaps because the people to whom it appealed had only recently been enfranchised, and therefore had no established party affilia-After many years of great strength, socialism as a political force in Germany collapsed when Fascism was enthroned under Hitler.

In the United States. Socialism as a party movement has had definite ups and downs. In 1888 the Socialist vote was 2,068; in 1904 it had increased to over 400,000; in 1912 it was approximately 900,000; and in 1920, when the nominee, Eugene Debs, was in prison, it reached There was a falling off of Socialist influence because of the party's attitude toward American participation in the World War, but the party maintained its organization, and threw its strength in 1924 to the support of Robert LaFollette. It is believed to have had then a voting strength of about 1,000,000. In 1928 the vote fell to 267,420, as considerable support went to the Democratic nominee, Alfred E. Smith. In 1932 there was a marked gain. Norman Thomas, the candidate, polled 884,781 votes, more than three times as many

as he had received four years earlier. In 1936, as in 1928, most of the vote again went to the Democratic nominee (Franklin D. Roosevelt), and Thomas received only 187,342 votes.

The best means of determining what are the principles of socialism, as held by adherents of the party in the United States, is to study the "working program" or platform of the party, which is regarded as a definite pledge.

The 1932 program of the party declares that its measures are calculated to strengthen the working people in their efforts to effect a coöperative commonwealth, which is the ultimate aim of the party, and to increase the power of resistance against what is termed capitalistic oppression. The platform is stated under three heads, Collective Ownership, Industrial Demands, and Political Demands; with the latter is included Unemployment Demands, seeking to secure government employment for all men out of work.

Collective Ownership includes the ownership and management of railroads, telegraphs, and telephones, express service, steamboat lines, "and all other social means of transportation and communication and of all large-scale industries." It includes the immediate acquirement by the government of such agencies as can be made to reduce the cost of living, such as grain elevators, stockyards, and storehouses. It asks for government ownership of mines, quarries, oil wells, forests, and water power; and the conservation and development of all natural resources for the benefit of the people. The collective ownership and democratic management of the banking and currency system is demanded; the collective ownership of land, wherever practicable, and where not practicable, an appropriation by taxation of the rental value of such land as is held for speculation or for exploitation of any kind.

The Industrial Demands are for the better protection of workers and their families. They include the shortening of the work day, in proportion to the increasing productiveness of machinery; securing to every worker a rest period of at least a day and a half each week; better inspection of workshops, factories, and mines; refusal to employ children under eighteen; a plan for giving convicts and their families the benefit of convict labor; the forbidding of interstate transportation of the products of convict labor, child labor, and that of uninspected factories and mines; the abolishing of the profit system in government work and substituting either the direct hire of labor or the awarding of contracts to cooperative groups of workers; the establishing of a minimum wage scale; the abolishing of public charity and substituting a system of old-age pensions and social insurance to protect every worker against unemployment, sickness, and accident. Mothers' pensions are also demanded.

The Political Demands are absolute freedom of press, speech, and assemblage; increase in the rates of the income-tax law; increase of rates of the corporation tax; the extension of inheritance taxes, graduated according to the value of the estate and the nearness of the kin, and the use of the proceeds from all such taxation for the socialization of industry; the abolition of personal or corporate ownership of patents, and the substitution of collective ownership, with a system of direct payment of the inventors by the government, by means of premiums or royalties; unrestricted and equal suffrage for men and women; universal adoption of initiative, referendum, recall, and proportional representation; the abolition of the veto power of the President; the abolition of the Senate; election of President and Vice-President by direct vote; abolition of the power of the Supreme Court of the United States to pass upon the constitutionality of the laws enacted by Congress; repeal of national laws by referendum vote of the people; abolition of restrictions upon amendments of the Constitution, so that it may be amended by a majority vote of the people; granting the right of suffrage in the District of Columbia, with representation in Congress, and a democratic form of government for local affairs; a democratic form of government for all United States territory; the Bureau of Education to be raised to the rank of a department of the government; extended measures for general education, with a plan for vocational training in the useful pursuits; a Bureau of Health and further measures for the conservation of health, with full liberty to all schools of practice; the abolition of Federal District Courts and of United States Circuit Courts of Appeal; a law by which state courts shall have jurisdiction in cases between citizens of the various states and foreign corporations; the election of all judges for a short term; curtailing the power of courts to issue injunctions; the free administration of the law; the calling of a convention for the revision of the Constitution of the United States.

Problems of Socialism. Many of the specific demands of socialism, as set forth in platforms, are reasonable, but they can be realized under a system of private enterprise. Moreover, the objective of socialism, which is an increased output of goods and their more equitable distribution, is laudable, but it is doubtful whether the objective would be realized. It is more probable that the vast government undertaking would break down because of the difficulty of administering enterprises of such great variety and magnitude, not to mention the difficulty of co-ordinating their several activities. In a socialist regime failure would be certain unless men of high ability were placed in charge of the state's enterprises, but there

is danger that the choice of managers would be dictated by political considerations, with disastrous results.

Another difficulty would be to induce the managers to put forth their best efforts in the service of the State. Would nonpecuniary rewards prove as effective in a socialist state as monetary rewards in a system of private enterprise? If not, socialism would lack the drive necessary to the realization of its aims.

Another serious problem is the treatment of labor. How determine which laborers shall perform specific tasks? How induce the laborers to exert themselves sufficiently? On what basis shall laborers be paid? Shall all share alike? Shall the wages (or hours of labor) vary with the attractiveness of the occupation? Shall wages be based on the relative scarcity of the labor required to perform the task? Or shall they be based on efficiency? These are difficult questions to decide.

Despite the uncertainty as to how socialism would work in practice, the movement makes a wide appeal, and has mustered great strength in many countries.

Related Subjects. The following articles will give added information:

Anarchism
Berger, Victor
Bolsheviks
Child Labor
Communism
Convict Labor
Debs, Eugene
Fascism
Income Tax
Inheritance Tax
Initiative and
Referendum

Labor, Department of Labor Organizations Minimum Wage Marx, Karl Mothers' Pensions Political Parties Old-Age Pensions Recall Sabotage Suffrage Syndicalism Townsend Plan

SOCIALIST PARTIES. See Socialism.

SOCIAL PRECEDENCE, preh seed' ens. From the earliest days of an ordered civilization, there have been individuals, castes, or classes of society that have assumed, or have been granted, precedence over others in social affairs. Thus, to go no further back than the Middle Ages, nobles and knights, in order of rank or of age, sat at table above the salt, while their retainers sat below. Precedence, in this sense, implies recognition or consideration of individuals according to their rank or dignity; it means priority of place, or superiority, in the conventional system of arrangement under which the more eminent and dignified orders of the community are classified on occasions of public ceremony and in the intercourse of private life.

In European countries, under the monarchical system of government, an order of precedence has long been clearly established and has been generally accepted as necessary to avoid social conflict and confusion. It has always been the custom, at every court, to establish a definite order of precedence for the various ranks of the nobility, for officers of state, for

the higher clergy, and especially for the representatives of foreign powers, who are invariably jealous of maintaining the prestige of their respective countries. In Great Britain, the order of precedence is well established and closely observed. The sovereign and his immediate relatives take precedence over all others. In the United States, and especially in the capital, the problem of social precedence has become increasingly important and difficult.

SOCIAL SECURITY ACT, passed by Congress in 1935, was amended in 1939. Its purpose is to prevent and to relieve the misfortunes that come when earnings are cut off by lack of work, old age, blindness, or death; when children are left with no one to support them or when they lack necessary care; or when the health of the community is not properly protected.

The Social Security Act is made up of ten distinct but related programs: (1) Old-Age and Survivors Insurance, (2) Unemployment Insurance, (3) Old-Age Assistance, (4) Aid to the Needy Blind, (5) Aid to Dependent Children, (6) Child-Welfare Services, (7) Services for Crippled Children, (8) Maternal and Child-Health Services, (9) Retraining for Disabled Workers, (10) Public, Health Services.

Only one of the programs—old-age and survivors insurance—is administered entirely by the Federal Government. The other nine programs are operated by the states with Federal co-operation and financial assistance.

The Social Security Board, created by the Social Security Act, is the Federal Agency for five of these programs—old-age and survivors insurance, unemployment insurance, old-age assistance, aid to the blind, and aid to dependent children. With the United States Treasury, it administers old-age and survivors insurance.

For the three child-health and welfare programs, the Children's Bureau of the Department of Labor is the Federal agency responsible for co-operation with the states; for vocational rehabilitation, the Office of Education; and for public health, the United States Public Health Service. The United States Treasury also co-operates in all these programs, handling the Federal money concerned.

The amendments of 1939 added more than one and one-half million workers to those covered by the old-age and survivors insurance program. They provided for monthly benefits to certain members of the families of insured workers, in addition to the monthly benefits to which workers themselves are entitled when they stop work at 65 years of age or later. Insurance protection for the families of deceased workers was also added. Payment of monthly benefits began January 1, 1940. Old-age and survivors insurance benefits are financed by a 1 per cent tax each on employees' wages and employers' payrolls, not to be increased until 1944.

State unemployment compensation laws provide for the payment of weekly benefits to jobless workers covered by the law who have sufficient wage credits to entitle them to benefits and who are able and willing to work. A Federal tax of 3 per cent is levied on the pay rolls of employers of eight or more persons in all occupations covered by the Act. Under the amendments of 1939 this tax applies only to the first \$3,000 a year paid to each employee.

By December, 1942, about 67,000,000 individual accounts had been established under the Federal old-age and survivors insurance program. During 1942, approximately forty million workers had acquired wage credits under their state unemployment insurance laws. Monthly benefits under the old-age and survivors insurance system range from \$10 to \$85 on an individual worker's account.

The Federal Government shares equally with the states in providing cash allowances to needy persons—up to a combined Federal-state total of \$40 a month for the needy aged, and the needy blind; \$18 a month for the first child, and \$12 a month for each other needy child in the same home. All states have programs for aid to the needy aged; all except Iowa, Nevada, and Alaska have (1942) approved plans for aid to dependent children, and all except Delaware, Illinois, Missouri, Pennsylvania, Nevada, and Alaska, for aid to the needy blind.

In addition to the foregoing, provision is made for the general extension and strengthening of state health services. Federal money is allotted by the surgeon general with approval of the administrator of the Federal Security Agency, according to the population, health problems, and financial needs of each state.

The 1939 law provides for the merit system in all state-administered plans after 1940. The Federal Government may withdraw its benefits where it finds administration defective. A.J.A.

SOCIAL SETTLEMENT, an institution that represents one phase of the great modern movement for the uplift of humanity from the vice and ignorance arising in congested centers.

Social settlements carry on many activities, chiefly of an educational and recreational character, such as kindergartens, schools in citizenship, clubs, classes, libraries, baths, and savings banks. They usually keep open halls where community groups may hold social, political, or religious gatherings. They are headquarters for all kinds of welfare movements, and often institute city or state reforms.

Toynbee Hall, the first social settlement, was founded by men of Oxford University, in London, in 1884. It was the outgrowth of work begun by Arnold Toynbee in the crowded Whitechapel district. In 1887 Dr. Stanton Coit established the Neighborhood Guild in New York, later the University Settlement. In 1889 Jane Addams and Ellen Gates Starr of Chicago

opened Hull House. Since that time, settlements and settlement methods have become common in great cities.

Related Subjects. The reader is referred to: Addams, Jane Hull House Community Interests ,Tenement

SOCIAL STUDIES. See Sociology; Vol-UME NINETEEN, READING AND STUDY GUIDE. Part Two (Social Studies Units).

SOCIAL SURVEY. See Sociology.

SOCIAL WAR. See ROME (Internal Affairs). SOCIAL WORK, CONFERENCE OF. Sociology (Applied Sociology).

SOCIETY ISLANDS. See Pacific Islands. SOCIETY FOR THE PREVENTION OF CRUELTY TO ANIMALS. See CRUELTY TO Animals, Society for the Prevention of.

SOCIETY OF FRIENDS. See QUAKERS. SOCIETY OF JESUS. See JESUITS. SOCIETY OF THE CINCINNATI.

CINCINNATI, SOCIETY OF THE.

SOCIOLOGY, so shih ol' o jie, the study of the human race, including its history, evolution, present condition, and probable future, the laws which govern its development, and the place of the individual in relation to society. The scope of sociology is necessarily broad. History, ethnology, civics, economics, anthropology, ethics, psychology, philosophy, and, above all, biology-all the sciences which treat of human beings and the conditions under which they live—are related to and contribute to sociology. This science rests on the assumption that all human experience depends on three things: the physical conditions under which life is maintained, the relation of the individual to other individuals and to society, and the types of association in which individuals influence each other. Before it can begin its research, sociology must have data on all these subjects, and so it goes for its part of statistics to the other social sciences. With the data which he gathers from every source, the sociologist endeavors to fix the laws and conditions of the reactions between nature and human beings, both as individuals and in the group; he is studying the evolution of human personality, the processes which result in types of individuals and of associates, types which act on each other in an endless cycle of cause and effect.

Other sciences—physics, chemistry, mathematics-rest on relatively unchanging, invariable laws. These sciences have reached the stage of development at which the ordinary phenomena of everyday life pertaining to them have been thoroughly investigated and generalized into definite and exact laws and formulas. Isidore Auguste Comte, when he first outlined the field of sociology and gave it its name, held that it, too, might be an exact and invariable science; but human behavior is much more complex than physical phenom-

ena, and has not yet been so completely studied or so accurately and definitely generalized. Biology, the study of all life, is the great foundation for the study of human life, and biology is even now in an unfinished state. Psychology, which studies the behavior of the human organism in its psychic contacts with its environment, is even less of a developed science, and it also is fundamental to sociology.

Important as is the biological heredity of the individual, his social heritage, although interlocked with the biological, forms the essential subject matter of sociology, and demands observational and scientific study of its origin and development, and especially of the methods by which it operates to form personality and to determine human association.

The five chief classes in the formal study of sociology—each class, in turn, is divided and subdivided—are (1) descriptive sociology, which includes all the preliminary work of stating observed phenomena; (2) social psychology, which covers the study of the growth of personality and the behavior of groups; (3) social ethics, which studies the social consequences of behavior, criticizes traditional theories and canons of social policy, and defines social objectives; (4) social technology, the application of known social facts and principles to the bettering of social conditions; and (5) social investigation, which applies scientific methods to the study of social phenomena and the formulation of sociological principles and laws. The true sociologist, loving his science, might well take his motto from Terence: Humani nil a me alienum puto-"I consider nothing human to be unimportant to me." L.L.B.

Applied Sociology

A modern sociologist investigates the behavior of men in groups, as a natural scientist studies a hive of bees. In this way, methods for taking stock of human relations have been perfected. As an engineer maps a region to find the best line for a road, social workers now examine a community to discover what can be done to improve it. This system of plotting conditions is called the social survey.

Gathering and Measuring Facts. During the last decade of the nineteenth century, Charles Booth directed an investigation of living conditions in London, which showed that nearly thirty-one per cent of the people in that city were in poverty. Some years later, the staff of Charities and The Commons conducted a survey of the steel industry about Pittsburgh, and disclosed its harsh circumstances. Since then, in many places, similar explorations of neglected corners of community life have been made. The Russell Sage Foundation established a department to help cities take stock of their social resources. Cleveland

devoted a fund to keeping track of its public agencies. The University of Chicago organized a laboratory to study and chart the currents of human activity in the region about it. Such field work has yielded a mass of information about the conduct of men in groups, and has tested definite ways of gathering this knowledge.

When we have found a number of facts, the next step is to arrange and measure them. In order to clean out a city slum, we need to know exactly how many tenements must be pulled down, the number and kinds of people to be lodged elsewhere, and how much the shift will cost. This requires counting, classifying, and calculating definite amounts. So in studying human groups, sociology now uses precise mathematical statements, wherever this is possible. The application of quantitative measurement to social groups is an

extension of statistics.

Investigating Living Standards. Although measuring wages and prices is primarily a task for economists, determining a reasonable standard of living concerns sociologists. During the third quarter of the last century, Frederick Le Play gathered data upon workingmen's budgets in Europe. From 1900 to 1902, the United States Bureau of Labor investigated the incomes and expenditures of American wage-earners. Since then, many studies have been made by public and private agencies, to find what level of health, comfort, and security is required by workers. Minimum-wage commissions in several states and countries have fixed basic rates of pay, established by conditions in their communities and by the nature of the businesses concerned. The United States Bureau of Labor Statistics publishes monthly an index showing changes in the cost of living. This presentation of actual conditions has proved a useful reference in adjusting wages.

Many other social agencies, such as insurance and pension bureaus, require exact information about the number of people and the amounts of money involved. Every reputable welfare institution is expected to publish a report showing the extent of its work and the disbursement of its funds. Such reports enable students of society to understand the size, character, and treatment of such problems

as poverty, disease, and crime.

Grand totals and averages tell little about individual cases. To understand the causes and personal consequences of general conditions, we must investigate the histories of representative men and women from various social classes. The method of tracing the development of individual characteristics is much like that of a physician in studying the course of disease in a patient. For this reason, it is called the case method.

The Case Method. The charity-organization movement, which originated in London in 1868 and quickly spread to America, emphasized, as one of its principles, careful investigation and registration of all applicants for aid. The records of modern relief societies have spaces for entering important items concerning the history and connections of every family treated. From such information, the cooperating agencies are supposed to outline a plan of treatment.

One of the most interesting recent developments of case work is the application of methods used by psychologists to discover the causes of mental disturbances. These are frequently found to spring from unfortunate experiences in early childhood, or from worries attendant upon bad living conditions. From studying the background of juvenile delinquents, there has been gathered a store of knowledge helpful for the guidance of parents and teachers. Well-equipped juvenile courts now include persons trained in this field. Smith College and Johns Hopkins University have special departments for preparing such workers. The idea of forestalling much unhappiness by wise treatment of abnormal persons has been spread by the National Committee of Mental Hygiene.

Transition from Relief to Reconstruction. In tracing the causes of social ills, it has been found that cases of poverty, disease, and crime are often merely end results of bad conditions in the community. Moreover, these conditions are permitted to exist because many people assume that they cannot be changed. Thus, poverty and disease are believed to be necessary evils. Modern social workers do not support this opinion. admit that alms and medicine are necessary for those who suffer from past misfortune and neglect, but they also try to remove the conditions that produce poverty and sickness. They even offer suggestions toward better ways of organizing common life. This changing point of view may be called the transition from emphasis upon relief to that of social reform

and reconstruction.

The Minority Report on the English Poor Law (1909) is a striking example of this change. The report makes plain the fact that not all poor people are dependent for the same It recommends that children be educated, that sick people be treated by the health authorities, that the unemployed be assisted to find work, and that the aged be granted pensions. This program calls for constructive effort by public authorities, instead of doles. The fact that the National Conference of the control of Conference of Charities and Correction in the United States has changed its title to the Conference of Social Work points in the same direction. Agencies dealing with delinquents now consider reformatory treatment and means for wholesome recreation, as well as punishment and prison discipline. This tendency has broadened and deepened the meaning of social work.

Community Organization. As acts of personal charity have been replaced by agencies dealing with hundreds of cases, these agencies have been obliged to develop better ways of working together. Private organizations have united in federations to secure funds and plan campaigns together. In some cases, public institutions have taken over the work of volunteer societies, and have thus expanded their efforts. This is particularly noticeable in the use of schoolhouses and park playgrounds to enlarge opportunities for recreation in New York and Chicago. Other places have combined both public and private agencies through a central council, in order to promote health or education in the widest possible way. This tendency to get together and work for the common welfare is an aspect of community organization.

The need for such procedure is illustrated in the treatment of unemployment. Private charity and union benefits may for a while help to bridge the gap between busy seasons. In order to find jobs for those who are out of work, a labor exchange must be set up to register all the openings and all the applicants. This can best be done by a public bureau. When industry cannot employ more workers, the local government may undertake public improvements, such as road-building or the construction of docks. For industries that are slack during certain seasons, a plan of insurance may be worked out, as has been done in England. But to keep some trades running evenly, the public must be led to plan their purchases ahead, and not place all their orders within a brief period. Working together to smooth out these waves in business has increased our understanding of the common basis of credit, trade, and industry.

Growing Humanitarianism. As knowledge of underlying conditions has grown, social workers have come to see that many local difficulties are merely evidences of widespread disorder. State and national organizations have been formed to meet these general situations. In some cases, it has been found necessary to make international agreements, in order to compass all the factors. This movement toward wider coöperation is practical evidence of growing humanitarianism.

For instance, the sale of opium may appear as a menace to people in American cities. It is soon found that the drug has been bought from a factory in another state, or has been smuggled across a national boundary. So international conferences are held to check the manufacture of morphine in England, and to limit the growth of poppies in Persia. The same principle applies to the use of alcohol, and other international problems considered by the League of Nations.

H.B.W.

Related Subjects. In connection with this discussion of sociology, the reader will find much that is of interest in the articles on the contributing sciences named above. He may also consult the following:

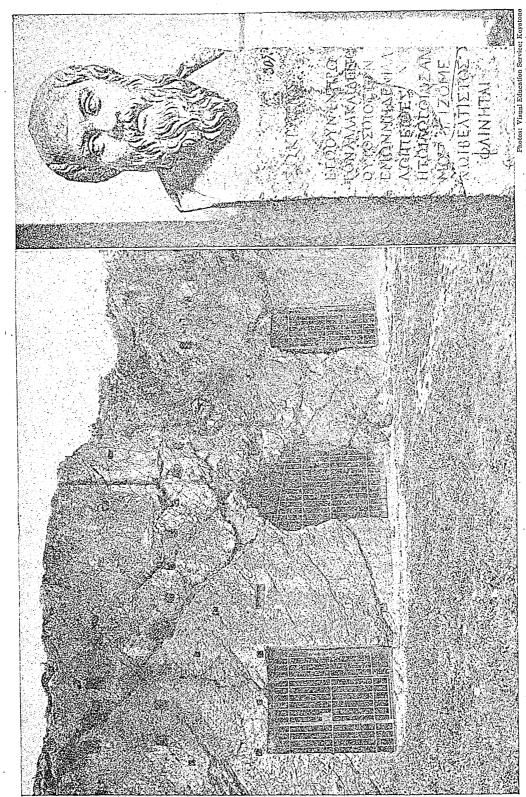
Illiteracy Juvenile Court Charity Child Labor Marriage Mothers' Pensions Children, Societies for Communism Old-Age Pensions Community Interests Oneida Community Comte, Isidore A. Pauperism Crime Polygamy Population Divorce Prohibition Emigration and Registration of Births, Immigration Deaths, and Marriages Environment Socialism Eugenics Social Settlements George Junior Republic Suicide Heredity Temperance Hull House Tenement

SOCKEYE, a species of salmon (which see). SOCRATES, sok' ra teez (469[?]-399 B.C.), one of the greatest of the Greek philosophers, was born in Athens. He received only a meager education in his youth, but later became familiar with the best philosophy and thought that the highly cultured Athenian society could offer. For a time his career was that of sculptor, but soon he began to walk the streets and market places, talking to anyone he might meet regarding his soul and the moral life of man in general. From 432 to 429 B.C., he was in military service; he fought at Delium in 424 and at Amphipolis in 422, but refused to take further part in public affairs after the naval Battle of Arginusae, when the mob unjustly demanded the death of ten generals who had been unable to bury the dead.

As a teacher, Socrates was not popular among the citizens of Athens. His personal appearance was against him, for he was bald, had thick lips, a flat nose, ungainly figure, and beggarly costume. He tried to reduce his wants to a minimum in order thus more closely to resemble the gods in their perfection. His wife Xanthippe (which see) has passed into tradition, possibly without proper basis of truth, as a scolding, arrant shrew whom he endured as a form of self-discipline.

THE EMPERIMENTATION POWERS TO A SECRETARION OF

He had many illustrious friends, among them Plato, Crito, Alcibiades, Xenophon, Phaedon, Euclid of Megara, and Aristippus. However, his chief work was among the Athenian youths, whom he felt called upon to conduct through love to a nobler moral life. Self-knowledge was his ideal; "Know thyself," his maxim. To him wickedness was the result of ignorance. The good, the useful, and the beautiful were declared by him to be identical. No man is willingly bad, he argued, and love of virtue can be taught. The best rulers are those who are wisest, not necessarily the best educated,



Socrates and His Prison at Athens. Unjustly condemned on the charges of impiety and of corrupting the minds of the youth of Greece, the philosopher drank the cup 6574 of poison hemlock. At right, a bust of Socrates, whom Milton pronounced, in Paradise Regained, "well inspired, wisest of men."

for they will most readily know how to make the people happy.

His method, known as the Socratic, became famous throughout the Mediterranean countries. It was an art of cross-examination which lured even the wisest into contradictions. He veiled his own knowledge behind a professed ignorance, and by a series of carefully directed questions brought out from his hearers the truth he sought.

In 399 B.C. Socrates was condemned to death, because he had introduced new gods and failed to worship the city divinities, and because, it was charged, he had corrupted the youth. During his trial, he gave the famous defense known as the "Apology of Socrates," but the jury, consisting of over 500 members, condemned him by a small majority. On the morning of the day of his death, his scolding and quarrelsome wife Xanthippe was banished by him from his cell, because of the violence of her grief. He is said to have spent the last hour in tranquillity, discoursing with friends on the immortality of the soul. When twilight appeared, he drank the poison hemlock, the cup reserved to those condemned, walked up and down, then lay down on his couch, and died in quiet.

The Socrates who frequently exclaimed, "How many things there are that I do not need," Plato eulogized as follows after his death: "Thus died the man who, of all with whom we are acquainted, was in death the noblest, in life the wisest and most just."

SODA, the general name of several sodium compounds occurring in nature in natural alkaline waters. The term soda is employed more commonly, however, to designate certain commercial compounds used in the household and in the industries. The sodas of commerce are manufactured by various processes from common salt. One kind, known in chemistry as sodium carbonate, is employed in the manufactur of glass and soap, as a disinfectant, and as a cleansing agent. Common names of sodium carbonate are sal soda and washing soda. Sodium bicarbonate is the common baking soda or saleratus used with sour milk or cream of tartar to raise bread, biscuits, or pastry. It is also an ingredient of baking powder (which When heated or when mixed with an acid, sodium bicarbonate gives up carbon dioxide, and the escaping gas puffs up the dough. Sodium bicarbonate is used in medicinal preparations for the relief of acidity of the stomach, and is one of the two compounds that make up Seidlitz powders (which see). Caustic soda, known as sodium hydroxide, is used in making hard soap, paper, and dyestuffs, and in bleaching and kerosene-oil-refining. See Sodium.

Chemical Formulas. The formula for sodium carbonate is Na₂CO₃; that is, a molecule contains two

atoms of sodium (natrium in Latin), one atom of carbon, and three atoms of oxygen. Sodium bicarbonate is NaHCO₃, its molecule containing one atom of sodium, one of hydrogen, one of carbon, and three atoms of oxygen. Sodium hydroxide is NaOH; its molecule contains one atom of sodium and the hydroxyl group OH. The latter is an association of one atom each of oxygen and hydrogen, the atoms remaining together in chemical reactions.

SODA LYE. See CAUSTIC.

SODA WATER, a pleasant, effervescing, and highly popular drink made of water charged with carbon dioxide and flavored with syrups. The carbon dioxide is stored in steel cylinders under high pressure, and the water is in a strong steel or copper tank. When the liquid carbon dioxide is allowed to escape into the water, it instantly changes to gas, which is dissolved in the water until the required pressure is reached, when the process is stopped. The pressure in the tank forces the water into the pipes in a soda fountain, and when it is drawn, the rapid escape of the gas causes the water to effervesce (see Absorption).

There is no soda in soda water. It was so named because, formerly, bicarbonate of soda was used in preparing the carbon dioxide for charging the water.

Soda water was first used in Philadelphia in the early part of the nineteenth century. The soda fountain was exhibited at the Paris Exposition in 1867, but soda water was little known in England until about 1908, when an American, Harry G. Selfridge, established a great department store in London and invested a large sum in a modern soda fountain.

SÖDERBLOM, NATHAN (1866-1931), eminent Swedish preacher and teacher, prochancellor of the University of Uppsala, archbishop of Uppsala, and from 1914 until his death head of the Swedish Church. His untiring efforts for world peace brought him the Nobel Prize in 1930. See NOBEL PRIZES.

SODIUM, a silvery white metal that is soft as wax and lighter than water. Its symbol is Na, from natrium, the Latin name of the element. Sodium and potassium are sometimes called the "great twins of chemistry," because they have so many common characteristics. Both are alkali metals, their compounds with hydrogen and oxygen being strongly alkaline. Both are intensely active chemically, and when thrown upon hot water, they unite with oxygen so violently that hydrogen is liberated and sufficient heat generated by chemical action to set the hydrogen on fire; the presence of sodium vapor causes a yellow flame. The affinity of sodium for oxygen is so great that it has to be kept in kerosene or naphtha, liquids that do not contain this gas.

Sodium constitutes about 2.6 per cent of the earth's crust, as compared with 2.4 per cent for potassium. Neither is found free in nature. Their compounds are so much alike in properties that a sodium compound can usually be substituted for a potassium compound in industrial processes, though the end products are different. Because sodium compounds are cheaper, they take precedence in industry. Potassium compounds find greater

use in agriculture, as fertilizers.

Sodium exists in large quantities in common salt (sodium chloride), which is a compound of this element and chlorine. In 1791 Nicolas Le Blanc discovered a process of obtaining sodium carbonate (sodium, carbon, and oxygen) from common salt, and so made accessible that useful commodity known commonly as soda. The Le Blanc process consists in heating salt with sulphuric acid, in roasting the resulting sodium sulphate with powdered coal and limestone, and in separating the carbonate from the final compound by solution in water. This process has been largely replaced by the Solvay method, and by the still newer electrolytic process. In the Solvay process, sodium bicarbonate (baking soda) is manufactured by the interaction of strong ammoniasaturated salt brine with carbon-dioxide gas, forced in at the bottom. The bicarbonate is precipitated and freed by filtration, and sodium carbonate is produced by heating. electrolytic process, the salt molecule in brine is split into sodium and chlorine by means of an electric current.

Other Compounds. Chile saltpeter, or sodium nitrate, is a valuable fertilizer and the chief source of nitric acid. Sodium sulphate is used as a substitute for the carbonate in the manufacture of cheap glass. It is also a medicine under the name Glauber's salt. Sodium sulphite is a serviceable preservative and a source of sulphur dioxide. Sodium thiosulphate is employed in fixing photographs, and sodium cyanide is valued in the extraction of gold from ore. The fluoride is an insecticide. The bromide and iodide are employed in nervous diseases. The sulphide finds a wide use in the manufacture of rayon.

Related Subjects. For further information regarding the compounds of sodium, and for supplementary facts, the reader is referred in these volumes to the following articles:

> Alkali Chemistry Chlorine Electrolysis Fertilizer

Glauber's Salt Potassium Salt Saltpeter Soda

SODIUM BICARBONATE. See SODA. SODIUM CARBONATE. See SODA. SODIUM FLUORIDE, floo' or ide. See INSECTICIDES AND FUNGICIDES, subhead.

SODIUM HYDROXIDE, hi drok' side. See

SODA; CAUSTIC.

SODIUM TETRABORATE, tet ra bo' rate. See Borax.

SODOM, sod' um, one of the ancient cities of the plain north of the Dead Sea. It lay in a region described, in Genesis XIII, 10, as having been "as the garden of the Lord," till Sodom and Gomorrah, a neighboring city, were overthrown by God because of the extreme wickedness of their inhabitants. It was at the time of the destruction of Sodom that Lot escaped in safety, according to the Biblical account, while his wife, lingering on the way, was turned into a pillar of salt. The fate of Sodom and Gomorrah is repeatedly mentioned in the Bible; likewise that of Lot's wife. Jesus himself, when exhorting His disciples to steadfastness (Luke XVII, 32), used the admonition, "Remember Lot's wife."

SODOM, APPLE OF, a fruit said to be beautiful to the sight, but to fill the mouth with bitter ashes when tasted. In early literature, it is recorded as growing near the Dead Sea. By many it is considered merely legendary, while others attempt to identify it with some plant now growing in that region. Some believe it to be a species of gall found on dwarf oaks (see Galls).

SOENDA ISLANDS. See SUNDA ISLANDS. SOFIA, saw' fe yah, or so fe' ah, capital of

Bulgaria (which see).

SOFTBALL, a modern game similar to base-ball which developed from indoor and play-ground baseball, and gradually became popular with millions of Americans, both young and adult. Softball differs from standard baseball in many ways, the most important of which are: a smaller diamond is used; the ball (about twelve inches in circumference) is larger; seven innings make a complete game; there are ten members to a team (the extra member is known as the short fielder); and the pitcher must pitch underhand. See BASEBALL.

SOGDIANA, sog dih a' nah. See Alexander the Great.

SOIL. The greater part of the earth's surface is covered with a layer of loose particles, varying in depth from a few inches to several feet. This layer is called *soil*. To the geologist the entire layer is soil, but the agriculturist includes in his idea of soil only those portions that are suitable for the production of plants.

Formation of Soil. The processes that form soil have been in operation from the remotest geological ages, and they are still active. The chief agencies in its formation are the atmos-

phere, water, plants, and animals.

Work of the Atmosphere. Air is composed chiefly of nitrogen and oxygen, and oxygen is the most active chemical agent known. Under the influence of moisture, it attacks the rocks and causes them to decay and crumble; the fine particles formed in this way are added to the soil. Again, in dry regions high winds wear away the rock by driving against it particles of sand which they carry, and the particles thus

worn away are carried in the air until they fall to the earth and are added to the soil. The peculiar forms of rocks in the Bad Lands of South Dakota and other localities are fashioned by wind. In sandy regions, sand dunes or drifts are formed by the wind, and in other localities, fertile soil is often carri, greater or less distances and added to the soil of the

region where it falls.

Water is by far the most region water. Water is by far the most region. important agent in the formation of soil. Running water will wear the hardest rock, and since nearly all running water carries sand and gravel, these assist in wearing the rocks over which the stream flows. The particles worn off are carried downstream until deposited on its bed or banks, forming the great alluvial deposits which characterize the lower portions of the valleys of great rivers; these formations contain some of the most fertile soil in the world.

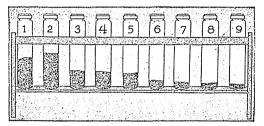
Rain and snow assist the atmosphere in breaking rocks into small fragments. When water freezes, the ice occupies more space than the water; we have seen pitchers broken by the freezing of the water in them. When water freezes in the crevice of a rock, it works in the same way and makes the crevice larger, so that, in the course of a number of years, the piece of rock is broken off. If we examine the base of any rocky cliff, we shall find an accumula-tion of pieces of various sizes, ranging from those weighing hundreds of pounds to tiny particles of soil. This mass of loose rock at the foot of a cliff is called talus. In addition to this, repeated freezing and thawing of water on the surface of rocks constantly wears them away, forming soil. This process is known as weathering. Water also acts chemically, since the oxygen in it attacks substances that have been dissolved from the rock.

In past geological ages, great glaciers covered most of the northern part of North America, and by their movement crushed and ground the rocks into soil, which they deposited where they melted. Much of the soil in Canada and in the United States north of the Ohio River and east of the Mississippi was formed by

glaciers (see GLACIER).

Work of Plants. The roots of plants, the leaves of trees, and the stems of all plants that are allowed to stand and die down in the fall, decay and become a part of the soil. Moreover, the roots, by extracting certain plant food from rocks, help to break them up. Sometimes large rocks are split apart by the roots of trees. Certain minute plants, such as molds, grow on decaying plants and hasten the process of changing these plants to soil.

Work of Animals. Animal waste is constantly added to the soil, and sooner or later the animal dies and its body decays and becomes a part of the earth. Animals not only add to the soil, but they are important agents in mixing the soil. Gophers burrow in the alfalfa field and damage the crop. Woodchucks burrow in the clover field and make mounds that are a hindrance to the farmer, and he attempts to destroy these and all other burrowing animals; yet in all ages these animals have performed an important part in making soil. But the small members of the animal kingdom, such animals as the earthworm and the ant. perform a work of far greater value. An au-



COMPOSITION OF LOAM In 200 grams (about seven ounces) of loam the constituent parts are as follows:

I. Organic matterhumus

Fine sand Coarse sand Medium sand Gravel

2. Very fine sand 3. Clay 4. Silt

7· 8. 9. Fine silt

thority on agriculture says, "Each ant hill is a real soil-mixing mill."

Earthworms burrow in damp, rich soil and derive their nourishment from the animal and vegetable matter it may contain. In order to obtain their food, these worms eat the earth but reject the portion containing no nourishment. In passing the soil through their digestive system, the worms pulverize it and cast it forth in a highly fertile state. Darwin estimated that in England these worms brought to the surface more than ten tons of dry mold to the acre. Air enters the soil through the holes made by the worms, and aids in the decomposition of substances beneath the surface. See

Transportation of Soil. We often find the soil on one side of a hill or valley to be very different from that on the other. This is because the soil in one place has been brought there from some other locality, probably by water or ice, and that in the other place is still lying where it was formed. We have already seen that rivers carry soil to the lower part of their course. Rain washes the soil down the slopes of a hill and deposits it on the lowlands. Hence the soil is deeper on these lands than on the hillsides. As water carries the soil, it also sifts it. In the upper course of the stream, where the current is usually swift, all grades of soil, including coarse gravel, are swept along, but as we go downstream, the soil becomes finer and finer, until in the lower course only the finest silt is carried.

Kinds of Soil. Soil is classified according to its composition and according to its texture. Soil contains mineral (inorganic) and animal and vegetable (organic) matter. The minerals in soil are chiefly clay, sand, and lime, the last of which is in the form of pulverized limestone. The organic matter, consisting of decaying animal and vegetable substances, such as leaves, twigs, and the dead bodies of animals, is called humus. A clay soil is more than one-half clay; a sandy soil is at least one-half sand. A loam is a soil in which clay, sand, and humus are mixed in about equal proportions. Since humus is necessary to fertility, loams are the most desirable soils for agricultural purposes. Loams are classified as clayey, sandy, and silt, according to their composition. Each is specially fitted to certain crops.

According to texture, soils are coarse or fine. Fine soils are the more desirable for agriculture, because they contain a larger proportion of humus and also hold water better. Each particle of soil is surrounded by a thin film of water like that on a marble that has been wet. This is the water used by growing plants. Free water drowns the roots and prevents them from absorbing nourishment, so that plants die where there is too much water. Since clay holds water, a certain proportion of clay is necessary to fertility. Sandy soils are infertile, because they do not hold water, and because they usually lack the necessary proportion of humus. This may be supplied in a measure by fertilizers.

Related Subjects. The reader is referred to the following articles:

Agriculture Irrigation
Clay Loam
Conservation Loess
(Soil Conservation) Manures
Drainage Marl
Dry Farming Phosphates
Erosion Rotation of Crops

SOIL, SCIENTIFIC MANAGEMENT OF THE. See AGRICULTURE (subhead); AGRICULTURE, UNITED STATES DEPARTMENT OF (Bureau of Chemistry and Soils).

SOL, the name of a proposed new month in the calendar year. See CALENDAR (Shall the Calendar Be Changed Again?).

SOL, sohl, a standard coin in Peru. See Money (Value of Foreign Monetary Units).

SOLANACEAE, sol a na' se e. See Night-HADE.

SOLANO, so lah' no. See CALIFORNIA (Religion: San Francisco Solano).

SOLANUM, so la' num, the typical and most important genus of the nightshade family of plants. It includes herbs and shrubs of more than 500 species, especially abundant in tropical America. The most common and important species is the common potato, and another is the eggplant. Other well-known species of

temperate regions are the bittersweet and the common nightshade, which are widely distributed throughout America and Europe, and the horse nettle and other spiny, troublesome weeds native to the United States. Several species, long ago used as medicine, are still employed by the Chinese as medical remedies. The fruits of many East Indian varieties are eaten, and a species known as the kangaroo apple is a common food in Australia and New Zealand.

Related Subjects. The following members of the genus are treated in these volumes:

Bittersweet Eggplant Nightshade Potato

SOLAR DAY. See TIME.

SOLAR ENGINE, OR SUN MOTOR, a mechanical device for collecting heat from the sun and utilizing it as motive power. A solar motor erected at Pasadena, Calif., in 1901, was the most successful up to that time, yet experiments were discontinued. It consisted of a huge mirror in the shape of an umbrella, thirty-six feet six inches in diameter at the widest end, tapering to fifteen feet at the bottom. The disk contained 1,788 small mirrors, so arranged that the sun's rays might be concentrated upon a boiler containing 100 gallons of water and space for eight cubic feet of steam. The boiler was connected with machinery that pumped water at the rate of 1,400 gallons per minute. By an automatic arrangement, steam in the boiler connected the mirror with clock-work which caused it to turn with the sun in its course.

C. G. Abbot, secretary of the Smithsonian Institution, demonstrated a new (his fifth) solar steam engine in 1936. By means of parabolic aluminum mirrors 15 per cent of the sun's energy is collected, which the inventor claims can be converted into steam "almost instantly." All experiments have been interesting, but the practicability of such devices is questioned. One objection is that they are not effective at night or on cloudy days.

SOLAR MICROSCOPE, an instrument for casting a magnified image of a small object upon a screen by means of sunlight or artificial illumination. It consists of a brass tube and a reflecting mirror, so adjusted that the rays of light are reflected into the tube. The object to be magnified is placed on a stage at the opposite end of the tube. The tube is attached to the inside of a closed window shutter, being placed over a hole. A double-convex lens collects, and brings to a focus on the object, the light rays, and, by means of a second lens, a magnified image of the object is projected on a white screen. Modern instruments usually make use of the electric arc or oxyhydrogen limelight, instead of the sun's rays. The solar microscope is similar to a stereopticon (which see).

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SOLARO, MOUNT. See CAPRI. SOLAR PHOTOGRAPHY. See Sun.

SOLAR PLEXUS, plek' sus, a large nerve center situated in the abdominal cavity between the aorta and the stomach. It is a network of sympathetic nerve threads [see NERVOUS SYSTEM (Sympathetic System)], connected by numerous branches with the vital organs of the abdomen, and is sometimes called the abdominal brain. Because of this arrangement, the organs of digestion and elimination and the heart are all connected one with another, and what affects one may affect all. A pugilist knocked out by a blow on a certain spot on the abdomen has been hit on the solar plexus; the force of the blow causes paralysis of the plexus, and this in turn This spot lies brings on unconsciousness. between the navel and the end of the breastbone, a little to the right.

SOLAR SPECTRUM. See Spectrum Anal-

SOLAR SYSTEM. When you hear someone speak of the sun as "Old Sol," you gain the impression of a friendly relationship, as though the huge ball of fire in the skies were a man to whose faithful care we owe our light, our heat, and an even more valuable possession, the genial sunniness of heart which we feel on pleasant days. There are a great many members of "Old Sol's" family—the solar system, as it is scientifically called—for our own earth is but one of countless bodies that travel round and round him, receiving and reflecting his light and heat in greater or less quantities, according to their nearness to or distance from him. First of all, there are the nine large planets, of which our earth is fifth in size; next, there are the smaller planetoids, or asteroids, which are counted in hundreds; lastly, there are the myriads of meteors, which travel in swarms and are so small that they are not visible unless they come in contact with our atmosphere, whereupon they become incandescent and are seen as shooting stars. Besides all these, there are the *comets*—"visitors from space," one astronomer calls them-some of which are "transients."

None of the members of the solar system moves about the sun in an exact circle, though all have regular orbits. When the distance of any one from the sun is stated, its mean distance is meant. A peculiar thing about the distance of the larger bodies, first shown to the astronomical world in 1772 by a German named Bode, may be seen in the following table:

	TENS OF MILLIONS	BODE'S
	OF MILES FROM SUN	NUMBERS
Mercury	3.59	4
Venus	6.72	7
Earth	9.29	10
Planetoid Eros	13.55	
Mars	14.15	16

Planetoid Ceres	25.70	28
Jupiter	48.33	52
Saturn	88.60	100
Uranus	178.19	196
Neptune	279.35	
Pluto	366.50	388

Bode formed his series of numbers by adding 4 to each number in the series, 0, 3, 6, 12, 24, 48, 96. In his day, the planets and planetoids italicized in the above table were unknown, but it was seen that the distances of six known planets corresponded very closely to his numbers. In 1781 Uranus was discovered, and was found to correspond fairly well with another number in the table. Astronomers began to take more interest in Bode's Law, and their search for a planet to correspond to the missing number 28 resulted in the discovery of Ceres and other asteroids. Whether or not the law represents a true law of the universe, scientists do not yet know.

Related Subjects. More about the solar system will be found under ASTRONOMY, and certain theories as to its origin in the article Nebular Hypothesis. The reader may also consult the following articles:

Asteroids Meteors
Comet Planet (with list)
Copernicus Satellite
Gravitation Sun

SOLDERS, sod' urz, alloys used to join surfaces or edges of certain metals, by fusion at the point of contact. To be effective, a solder must melt more easily than the metal to which it is applied. Solders may be either hard or Hard varieties are usually prepared by combining, in each case, the metal to be soldered with some others. Solder for gold, for example, is prepared from gold and silver, or from gold and copper, or from a mixture of the three metals. Silver solder consists of equal parts of silver and brass, with the addition of a little zinc. Soft varieties are prepared from varying proportions of tin and lead, bismuth being sometimes added. Hard solders can be drawn out into threads and hammered into sheets. That is, they are both ductile and malleable. Soft solders melt the more easily, but are too brittle to bear hammering. Before surfaces are soldered, they must be bright and clean and free from oxide.

SOLDIERS' BONUS. Certain members of the army, navy, and marines who served in the World War under the flag of the United States were granted a bonus in May, 1924, for service rendered, in addition to the regular pay provided while in uniform. The country deemed the regular pay allotted soldiers inadequate. The bonus law applied to men up to and including the rank of captain in the army, lieutenant in the navy, first lieutenant or first lieutenant of engineers in the Coast Guard, and passed assistant surgeon in the Public Health Service. In the phraseology of the statute, the bonus was termed "adjusted compensation" or "ad-

justed service credit." It took the form of a cash payment to each person whose credit was \$50 or less and an insurance policy in each case where the adjusted credit exceeded that sum. In cases where death had intervened, the beneficiaries' immediate families

received cash payments.

The adjusted compensation was figured on the basis of \$1.00 per day for service at home and \$1.25 per day for overseas detail for the period of active service in excess of sixty days, the maximum credit being restricted to \$500 for a man with home service and \$625 for a man with overseas service. The sixty-day exception was made because upon discharge each soldier was given \$60 in addition to his regular compensation.

The insurance took the form of a twentyyear endowment policy, the amount of each policy being determined by a somewhat intricate table of factors based on length of service and the attained age of the veteran. As an example of the benefits conferred—a man aged thirty-three at date of issue who was 180 days in home service and 100 days in Europe, received a policy with face value of \$615. See

Pension.

SOLDIERS' HOMES, homes maintained by a government for disabled or aged soldiers. These afford provision for the comfort and wellbeing of soldiers who have lost their health in the country's service, or who later become incapacitated for earning a living. Applicants for admission to homes must be provided with an honorable discharge from military service.

The first soldiers' home was founded in the District of Columbia, by act of Congress, in 1851. This home is for soldiers of the regular army and is known as the United States

Soldiers' Home.

The first National Home for Disabled Volunteer Soldiers was established in 1866. All homes were consolidated on July 3, 1930, into the Veterans Administration and are now known as Veterans Administration Facilities. They are located as follows:

Bath, N. Y. Bay Pines, Fla. Biloxi, Miss. Dayton, O. Hot Springs, S. D.

Kecoughtan, Va. Los Angeles, Calif. Mountain Home, Tenn. Togus, Me. Wadsworth, Kan. Wood, Wis.

State homes for soldiers of the volunteer armies, to which the Federal government contributes \$120 per year for each inmate who is eligible, are located at:

Napa County, Calif. Homelake, Colo. Noroton Heights, Conn. Boise, Ida. Quincy, Ill. Lafayette, Ind. Marshalltown, Ia.

Fort Dodge, Kan. Chelsea, Mass. Grand Rapids, Mich. Minneapolis, Minn. Saint James, Mo. Columbia Falls, Mont.

Grand Island and Milford, Neb. Tilton, N. H. Menlo Park and Vineland, N. J. Oxford, N. Y. Lisbon, N. D. Sandusky, O.

Erie, Pa. Bristol, R. I. Hot Springs, S. D. Bennington, Vt. Orting and Retsil, Wash. Waupaca, Wis. Buffalo, Wyo.

Confederate Soldiers' Home. Beauvoir, near Biloxi, Miss., the last residence of Iefferson Davis was deeded to the United Sons of Confederate Veterans by Mrs. Davis. This beautiful colonial home and a group of other buildings constitutes the Mississippi State Confederate Soldiers' Home for the up-keep of which the state of Mississippi makes a biennial appropriation. See DAVIS, JEFFERSON.

and illustration, page 1838.

SOLE, a family of flatfish having the characteristic twisted cranium and both eyes on the right side of the body (see Flatfish). The eyes are small and set close together, the mouth is crooked, and the body a flattened oval, something like the sole of the human foot in shape. These fish are found in warm seas near shore. The common American sole. known locally as the hogchoker, inhabits the eastern coast seas of North America, and is worthless as food. However, other American flatfish marketed as sole, are excellent as food fishes. The European species is much prized, because its flesh is firm and white and of good flavor. The European sole grows from ten to twenty inches in length, and averages about a pound in weight. Species of flounder that inhabit coast waters are also known as soles. See FLOUNDER.

Scientific Names. The American sole is Achirus fasciatus. The European is Solea vulgaris.

See California (Religion: SOLEDAD. Nuestra Señora de la Soledad).

SOLEMN LEAGUE AND COVENANT. See Covenanters.

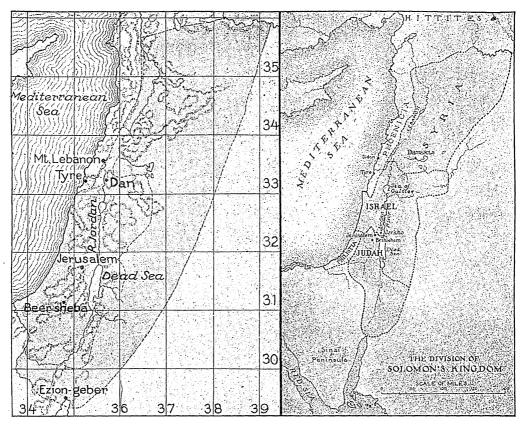
SOLICITOR OF THE TREASURY, the legal adviser of the department. See TREASURY, DEPARTMENT OF THE.

SOLID, a term used in mathematics to define a geometric figure with the three dimensions of length, breadth, and thickness. Any particular solid takes its name from the shape of its bounding surfaces, as cube, sphere, etc.

In physics, a body is said to be solid, liquid, or gaseous according to the power of its molecules to resist forces tending to change its shape (see Liquid; Gas).

Related Subjects. The reader is referred to: Cone Mensuration Cube Prism Pyramid Cubic Measure Cylinder Sphere Spheroid Geometry

SOLIDS. See Molecule (Molecular Force). SOLIS so lees', DIAZ DE. See RIO DE LA PLATA; URUGUAY.



THE KINGDOM OF SOLOMON

The dotted line farthest east in the first map represents approximately the eastern boundary of the territory directly influenced by Solomon's reign. The map at the right shows the division of the kingdom after his death.

SOLITAIRE, sol ih tair', the collective name of many games of cards to be played by one person. The object of the games in practically all variations is to arrange the cards in suits, and build up or down in regular sequence, while following certain rules. The player's interest lies in the extent of his success in working out the various combinations. Under the name of patience, these games have been known and played for centuries, though few ancient writers give details of the various plays. In some variations of solitaire, the exercise of skill and judgment is necessary, but in most they depend entirely on the element of luck. A great number of solitaire games are described in manuals of card games.

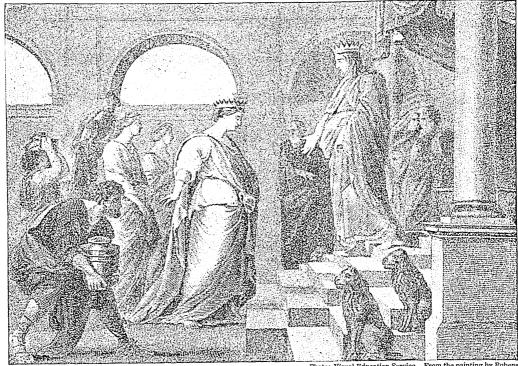
SOLOGUB, sol' o goop, Feodor. See Russian Literature.

SOLOMON, the third king of Israel and the wisest man of his age, was the son of David and Bathsheba. His reign extended from about 993 to 953 B.C. He was born in Jerusalem, but nothing is known about his boyhood. Many suppose that the prophet Nathan was his teacher. However this may be, the knowledge and ability which he showed when he

became king would lead to the belief that he had received the best training possible for the high office he was to fill.

When King David was about to die, Solomon's brother Adonijah attempted to make himself king; but David had promised Bathsheba that Solomon should succeed him as king, so Bathsheba and Nathan told David of Adonijah's attempt. David then told Nathan to have Solomon ride to Gibeon, and there be anointed king by Zadok, the priest. When this was done, Adonijah and his followers feared for their lives, and "each man went his own way," leaving Solomon in peaceful possession of the kingdom; but, according to the custom of his time, Solomon caused the leading men who had opposed him to be slain, one by one.

Solomon's Dream. Solomon is supposed to have been about twenty years of age when he became king. He was a zealous worshiper of Jehovah, and began his duties by offering sacrifices and giving God thanks for the great favors conferred upon him. In the night, God appeared to Solomon in a dream and said, "Ask what I shall give thee"; and Solomon said:



THE QUEEN OF SHEBA VISITS KING SOLOMON [See I Kings x, 1-13.]

O, Lord, my God, thou hast made thy servant King instead of David, my father: and I am but a little child; I know not how to go out or come in. And thy servant is in the midst of thy people which thou hast chosen, a great people, that cannot be numbered nor counted for multitude. Give thy servant therefore an understanding heart to judge thy people, that I may discern between good and evil, for who is able to judge this, thy great people?

The record states that "the speech pleased the Lord," and Solomon was promised not only wisdom, but also wealth and honor. The promise was literally fulfilled, for Solomon was recognized as the wisest and wealthiest king of his age.

Building the Temple and Palace. 'According to the account in I Chronicles, David, before his death, gave Solomon the plans and full directions for building the Temple, for which he had gathered together most of the material. Solomon formed an alliance with Hiram, king of Tyre, by whom he was furnished with skilled workmen and cedar. The structure was begun in the fourth year of his reign, and seven years were required for its completion. Though small and plain compared with many of the cathedrals of modern times, the Temple was considered to be one of the most wonderful buildings of its time. Its completion established Jerusalem as the center of worship for the nation, as well as the center of government.

Solomon also built for himself a palace upon grounds adjoining those of the Temple. This required thirteen years for its completion, and it was not finished until the twentieth year of his reign.

Extending Commerce. Solomon placed fleets of ships on the Red Sea and on the Med-These vessels were manned by iterranean. Phoenician sailors, because the Israelites were not acquainted with the art of navigation. The fleets of Solomon are supposed to have sailed southward as far as the southern part of Africa, and westward as far as Spain. Some authorities believe that they sailed eastward as far as India, but there is no positive information concerning the extent of any of these voyages. We do know, however, that Solomon extended the commerce of his kingdom to all surrounding nations, and that his ships, for that age, made long voyages. As a result of his trade with so many peoples, he gained great wealth, which he expended in maintaining his army and court.

The Splendor of the King. Soon after he became king, Solomon made an alliance with Pharaoh, king of Egypt, and married his daughter, bringing her to Jerusalem. His palace was one of the most magnificent structures of the time. His throne was of ivory covered with gold. All the kingdoms over which he ruled



THE STABLES OF SOLOMON UNCOVERED

In the Bible (I Kings x, 26) is a record of the chariots and horsemen of this great king. In 1928 an expedition led by scientists of the University of Chicago, engaged in the work of excavation in Armageddon in Palestine, discovered the remains of the stables of Solomon. They were laid out very systematically. In a report, it is stated that the stalls, built of large stone blocks, are arranged in double rows. The horses, about twelve to a row, stood facing each other, with a passage between the two rows of heads for the grooms and keepers to feed and control them. In front of each horse was its manger, and the rows of mangers were divided by received the thickney are which still control the propriate the horse typical tips hale for the invention of belter report. vided by massive stone hitching posts, which still contain the original tie holes for the insertion of halter ropes.

"brought presents and served Solomon all the days of his life." "And the king made silver to be in Jerusalem as stones, and cedars made he to be as sycamore trees that are in the low-land, for abundance." We read also that he had 40,000 stalls of horses for his chariots and 12,000 horsemen. In addition to these, were several hundred officials of state and attendants who were maintained in and about his palace.

Solomon's Wisdom. Solomon was more than a judge and lawgiver to his people. He studied into the secrets of nature and learned many facts that previous to his time had not been observed. From the proverbs which he spoke, we know that he had a good knowledge of plants and animals; also, that he was a student of human nature. His proverbs are guides to life, and for three thousand years they have influenced men. The Bible tells us that "he spoke three thousand proverbs, and his songs were a thousand and five." Nevertheless,

The Song of Solomon and the proverbs found in the book of Proverbs are all that remain of his sayings and writings, but these are enough to place him among the wisest of men. After communing with him, the Queen of Sheba, who visited him with all the pomp and splendor of an Eastern monarch, exclaimed, "The half was not told me; thy wisdom and prosperity exceedeth the fame which I heard. Happy are thy men, happy are these thy servants, which stand continually before thee, and that hear thy wisdom."

His Decline. Contrary to the Hebrew ideals, Solomon established a harem, and made alliances with women of the surrounding heathen nations. In time, to appease these women, he erected altars to their gods in and about Jerusalem. This weakened his influence over the Israelites, and caused dissension in his court. Moreover, the extravagance of the court caused a heavy burden of taxation, under which the people had become restive; thus, during the last years of his reign, the seeds of dissension, which bore fruit in the division of the kingdom after his death, were sown. He reigned forty years, and was succeeded by his son Rehoboam.

Estimate of His Character. In his temperament and tastes, Solomon was the opposite of his father David. He preferred the pursuits of peace, and under him the Hebrew nation enjoyed a longer period of peace and prosperity than at any other time in its history.

Derivation. Solomon's name means peaceful, and it was given him because of a prophecy which fore-told his birth: "His name shall be Solomon, and I will give peace and quietness unto Israel in his days" (I Chronicles XXII, 9). The story of Solomon is found in I Kings, I-XI, and in II Chronicles, I-IX.

Related Subjects. The reader is referred to:

David Phoenicia Solomon's Song
Jerusalem Proverbs Temple

SOLOMON ISLANDS, British Pacific protectorate (Bougainville, Buka, Choiseul, Florida, Gizo, Guadalcanal, Malaita, New Georgia, San Cristobal, San Isabel, and numerous smaller islands) control of which was seized by Japan early in 1942. Because the occupation of these important bases for naval operations threatened the United States line of supply to Australia, these islands became one of the most bitterly contested areas of World War II. For the Battle of the Solomon Islands, see WORLD WAR II; see also PACIFIC ISLANDS.

History. Discovered in 1567, these islands were named *Islas de Salomon* by Alvaro Mendana de Neyra because he thought he had found the source of gold used for Solomon's temple at Jerusalem. Later expeditions were unable to locate the islands again until Philip Carteret, an Englishman, landed there in 1767. German possessions in the Solomons were mandated to Australia after World War I.

SOLOMON'S SONG, SONG OF SONGS, OR CANTICLES, one of the books of the Old Testament, a dramatic poem written in celebration of wedded love. In its present form, the original assignment of parts to characters is difficult to restore. There are two current interpretations. In the first of these, King Solomon, disguised as a shepherd, woos a country maiden and takes her finally to his court, where they are married in great splendor, returning afterward to her rural home for a honeymoon. In the second, the maiden, though surrounded by all the allurements of king and court, remains true to an actual shepherd lover, to whom she at last returns.

In Jewish theology, Solomon's Song is considered as an allegory, picturing the close relationship between God and Israel. Christian commentators regard it as symbolizing the union of Christ and the Church. See Solomon.

SOLON, so' lun (about 639-559 B.C.), an Athenian statesman, one of the most famous lawgivers of all time, who will always be re-

membered as one of the "seven wise men of Greece." He was by class a noble, and was well educated, but was obliged to support himself by commercial ventures. His first public service consisted in an appeal to the Athenians, which led to the regaining of the island of Salamis, long in foreign hands. About 594 B.C., he was elected archon, and promptly instituted legal and governmental measures which have made his name famous.

Political and economic reforms were sadly needed in Athens. Most of the money had accumulated in the hands of a comparative few; living was high, and the small farmers had been compelled in many instances to mortgage their land, while the free laborers had sold themselves into slavery in order to live. By a sweeping ordinance, Solon annulled all these debts and mortgages, and provided that, in the future, no man should pledge his own person as security in borrowing money. He changed the system of coinage in such a way as to give immediate relief to many, and forbade the exportation of most articles.

His constitutional reforms consisted in a redivision of citizens into four classes, according to income, members of all classes to hold membership in the assembly and in the public law courts. In that offices were open only to members of the three higher classes, and the archonship only to the highest class, the reforms of Solon left the constitution of Athens oligarchic, but the granting of legal privileges to every citizen was a step toward democracy.

According to tradition, Solon pledged the Athenians to keep his laws for ten years, and left the state for that length of time. Civil strife broke out almost immediately, however, and before the death of Solon, Athens had come under control of the tyrant Pisistratus.

Related Subjects. The reader is referred in these volumes to the following articles:

Archon Pisistratus
Oligarchy Seven Wise Men

SOL STATE. See Colloids.

SOLSTICE, sol' stis, a term used in astronomy to describe the point in the ecliptic at the greatest distance from the equator, either north in summer or south in winter. The word is derived from the Latin solstitium, meaning a standing still of the sun. In the spring, the sun crosses the equator about March 20, the vernal equinox; continuing its northward journey, it reaches the farthest point north about June 21, the summer solstice. The sun apparently stands still, or holds the same position for several days, before starting southward. Crossing the equator again about September 23, it reaches the southern winter solstice about December 22. In the northern hemisphere, June 21 has the longest and December 22 the shortest period of daylight in the year.

Related Subjects. The reader is referred in these volumes to the following articles:

Ecliptic Equator Equinox Seasons

Sun Tropics

SOLUTION, so lu' shun. When the particles of a solid, such as sugar, or of a gas, as carbon dioxide, or of a liquid, as alcohol, mingle with the particles of a fluid so completely that a uniform liquid results, a solution is formed. The fluid in which the substance is dissolved is called the solvent; the substance dissolved is the solute. The resulting liquid is not an example of chemical, but physical, change, for a new chemical compound is not formed. In case of a sugar solution, for example, the substance may be reconverted into sugar by evaporating the water. When any solvent has dissolved as much of a given substance as it can, the solution is said to be saturated. At the same time, it may not be saturated with respect to another substance, for a saturated salt solution will dissolve sugar crystals. When a solid changes to a liquid form, heat is absorbed, and it is on this principle that freezing mixtures are based. When pounded ice and salt are mixed together and packed about an ice-cream receptacle, they change to liquid form, and in so doing absorb heat from the contents of the can.

At a given temperature, the solubility of a particular solid in a given liquid never varies, but its solubility varies with different solvents. At ordinary temperatures, table salt dissolves about three times as freely in water as in alcohol; grease cannot be dissolved in water, but it can be in gasoline. Some very hard substances are slightly soluble. Flint glass, for example, used in making cut-glass utensils, dissolves somewhat in aqua ammonia. For this reason, the housewife should never clean her cut glass in water containing ammonia. When a gas dissolves in a liquid, there is a release of heat and a rise of temperature. See, also, Colloids.

SOLWAY FIRTH, an inlet of the Irish Sea, between Scotland and Cumberland County, England. It is about thirty-five miles long, and its width increases irregularly till it reaches twenty miles. Solway Firth is particularly noted for its spring tide, which drives in as a tidal bore six feet high at the rate of ten miles an hour. The waters are shallow and stocked

with fish, particularly salmon.

SOLYMAN II, OR SULEIMAN (1494-1566), a sultan of Turkey, known as Solyman the Magnificent, under whom the Turkish Empire reached the height of its power. The country at his accession was prosperous, the army and the provinces were in excellent shape, and Solyman showed himself well able to make the best of these advantages. In his own country, he is known as the lawgiver, for he did much to improve the administration of law and, incidentally, to better the condition of his Christian subjects; but it is chiefly for his conquests that he is remembered in European history.

He captured Belgrade and pressed on into Hungary, winning in 1526 a famous victory at Mohacs. Twice he threatened Vienna, and though compelled to retreat, could never be forced to give up his hold on Hungary. He took Rhodes from the Knights of Malta, partially subjugated Persia, and showed his ambition to take part in European political affairs by making a treaty of alliance with Francis I of France. Literature had the benefit of his encouragement, and he proved himself generally an enlightened ruler. See TURKEY (History).

SOLYMAN THE MAGNIFICENT. See

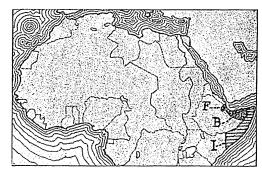
Solyman II.

SOMA, so' mah, CELLS. See HEREDITY (The Physical Basis of Heredity).

SOMALI, so mah' le, COAST, the part of Somaliland (see below) which is French territory. See, also, FRENCH SOMALILAND.

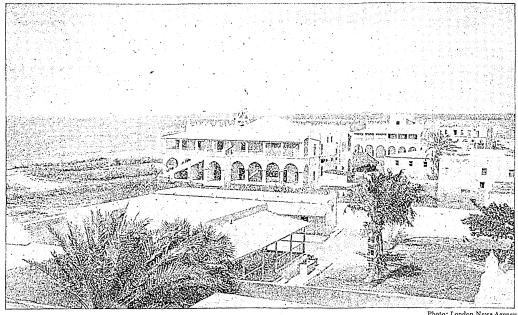
SOMALILAND, so mah' le land, or SO-MALI, so mah' le, a region in the eastern part of Africa, consisting of English, French, and Italian dependencies. Somaliland forms the peninsula which lies between the Gulf of Aden and the Indian Ocean.

French Somaliland, sometimes called the Somali Coast, lies to the north, at the head of the Gulf of Aden, between Somaliland Protectorate (British) and Eritrea. It has an



SOMALILAND (F) French; (B) British; (I) Italian.

area of 8,492 square miles, and a population estimated at 44,240 (1936). There are several ports, the chief being Djibouti (Jibuti), with a population of 20,000 (1939 estimate). This town is the seat of government of the colony, and is connected with Ethiopia (Abyssinia) by a railway. Somali Coast is not well developed industrially, but there is a considerable export trade in coffee, hides, skins, gold, animal wax, salt, and ivory. Overseas trade is chiefly with France and Great Britain. The coast country is hilly, but the interior is an elevated plateau.



THE PORT OF KISMAYU

To past generations Africa was described as the "Dark Continent." There is nothing in this Italian port to justify the term. Except in the vast interior, there is everywhere evidence of the culture of the white race.

British Somaliland is sometimes known as Somaliland Protectorate. It borders on the Gulf of Aden, and on the west side adjoins Somali Coast, Abyssinia, and Italian Somaliland. The protectorate is about 68,000 square miles in area, and has a population estimated to be 344,700 (1935). Nearly all of the natives are Mohammedans, and, with the exception of those who dwell in the coast towns, they are wandering herdsmen. Berbera, the largest town and the seat of government, has between 15,000 and 30,000 inhabitants, the number increasing in the cold season. Hargeisa (15,000 to 20,000) is the second largest. Exports include skins and hides; cattle, sheep, and goats; gum and resins; and ivory. The region is for the most part a sandy plain and was the scene of British and Italian attacks and counterattacks during World War II.

Italian Somaliland, or Somalia, is a region extending along the Indian Ocean from British Somaliland to Dik's Head in Kenya Colony. By treaty arrangements with Great Britain in 1924, this area was enlarged to a total of about 194,000 square miles. The dependency has two major divisions: Northern Somalia and Southern Somalia. The population was officially 1,021,572 in 1931, of whom 1.010,000 were non-Europeans. Along the coast the land is flat, but the inland regions are hilly. Exports include hides, cotton and cotton-seed oil, gums, sesame oil, butter, resin, kapok, and ivory. The chief occupations of the people are agriculture and stock raising.

Mogadiscio, the capital (population, 55,000), is one of the chief ports. With its fall to the British in February, 1941, the region was lost to its Italian defenders. See PROTECTORATE.

SOMERVILLE, Mass., a residential city of Middlesex County, in the eastern part of the state, about two miles northwest of Boston and close to Medford and Cambridge. The city is built on a series of hills on the Mystic River, here crossed by two bridges. From many of its eminences, beautiful views of the city of Boston are obtained. Somerville is identified with the activities of the early patriots in the Revolutionary War, and there are many historic places. Population, 102,177 (1940).

The city occupies an area of about four square miles, but is compactly settled. There is a large park area, and a number of boulevards lead directly to the Metropolitan reservations of Middlesex Fells, Mystic Lake, and Revere Beach. Paul Revere, on his famous ride in 1775, passed through the city over the street now known as Broadway.

Transportation. The Boston & Maine Railroad serves the city, and numerous electric-car lines connect with Boston and its many suburbs. There are also numerous motorbus lines.

Industries. Somerville has two miles of frontage on the Mystic River, which increases its value for industrial purposes. There are about 150 industrial establishments, including slaughtering and meatpacking plants, lumber and planing mills, manufactories of furniture, paper and paper boxes, bakery

products, and jewelry, a Ford assembling plant, woolen mills, and a brass foundry.

Institutions and Historic Places. Among the prominent modern features of the city are the state armory, city hall, hospitals, and home for the aged. On Powder House Hill, in Tufts Park, is the old stone powder house where, on September 1, 1774, General Gage seized a quantity of gunpowder stored in anticipation of an outbreak of hostilities. On Prospect Hill, Israel Putnam raised the "Appeal to Heaven" flag on July 18, 1775.

History. Somerville, originally a part of Charlestown, was settled in 1630. A year later, 600 acres known as "the Ten Hills Farm" were granted to John Winthrop, who built and launched there, on the shores of the Mystic, the Blessing of the Bay, the first ship built in New England. Somerville was separately incorporated in 1842 under its present name. A city charter was granted in 1872.

SOMMA, MOUNT. See VESUVIUS.

SOMME, sohm, RIVER, a stream in the northern part of France, in the vicinity of which an important battle of World War I, and a lesser engagement of World War II, were fought. The Somme rises in the department of Aisne, and follows a general westerly course of 140 miles to its estuary on the English Channel. Along this estuary ocean steamers enter the port of Saint Valery. A canal runs parallel with the Somme from Saint Valery past Amiens to Saint Quentin, and from that point there is communication by canal with the Oise and the Scheldt.

Battles of the Somme. The first important engagement was the great Anglo-French offensive against the Germans during the summer of 1916. The British forces occupied the front to the north of the river, while the French held a mile of the front on the northern bank, and a ten-mile front south of the river. The first infantry charge was made on the morning of July 1, but this drive had been preceded by an intense artillery bombardment of the enemy's intrenchments and fortifications. After two weeks of furious fighting, the British had advanced three miles on a ten-mile front and had captured 10,000 prisoners; the French, in the same period, had advanced their line six miles and had captured 12,235 men. Then followed furious German counter-attacks, but, by the first of August, twenty-four square miles of territory had been conquered by the British.

The second offensive began on September 3 and continued without abatement until interrupted by heavy rainstorms. The Allies made their last attacks in November. It was during the second phase of the

drive that the British first used tanks.

In summing up the results of the Battle of the Somme, General Haig, commander in chief of the British forces, claimed that it was a success, because (1) it had drawn the enemy from Verdun; (2) it had held large forces of Germans on the western front and enabled Russia to win a victory in the east; (3) it had inflicted heavy losses on the German army. In all, 120 square miles of territory were conquered by the Allies. Statements of the losses on both sides were conflicting, but a fairly accurate estimate gave the allied loss as 675,000, and the German as high as 700,000 in killed, wounded, and prisoners.

During Germany's lightning invasion of France in 1940, French and British forces attempted to establish a defensive front along the Somme. In this battle, however, Allied resistance crumbled quickly beneath the Nazi war machine. See WORLD WARI, II.

SOMNAMBULISM, som nam' bu liz'm, or SLEEPWALKING, a curious condition in which a sleeper acts his dreams. Everybody dreams occasionally during sleep, and a great many people talk aloud in their dreams, but the person who translates his dreams into mo-There are, of tion is comparatively rare. course, many degrees of such activity, from simply getting out of bed and walking about to performing complicated and difficult muscular feats. Tests have been made which prove that, as a rule, a somnambulist cannot hear ordinary sounds; that, whether his eyes are closed, or half closed, or wide open, he does not see; that he can neither taste nor smell. But he is usually endowed with marvelous muscular control. Sleepwalkers have been known to write letters, to paint pictures, or to perform other familiar tasks; they have also been known to climb steep roofs and to walk along the ridges, to follow narrow and dangerous paths, and to accomplish other feats which they could not perform if they were conscious. When a somnambulist awakes, if he remembers anything at all, he remembers it merely as a dream.

From the standpoint of psychology, somnambulism is an example of dissociation, or division of attention, in which the sleeper is attentive to but one line of action, and is directed by the subconscious mind. It may be considered an exaggerated form of absent-mindedness. The hypnotic state is a condition of somnambulism produced by suggestion. Sleepwalking occurs usually in highly nervous persons, and the cure depends on removing the cause. General care of the health and avoidance of strain and excitement will help many cases. See Subconscious.

W.A.E.

SOMNUS, in Greek mythology, the god of sleep, and the son of Erebus and Nox, the goddess of night. He dwelt in a great cave in a remote and quiet valley, with his brother Mors, the god of death. Shadowy forms kept watch about the mouth of the cave, and shook great bunches of poppies, while they enjoined silence upon all who came near. In one of the darkened inner rooms of the cave, drowsy Somnus lay upon his couch, clothed in black garments studded with stars. On his head was a crown of poppies, and in his hand a goblet of poppy juice. Morpheus, his prime minister, supported his head and protected him during his slumbers. Pleasant Dreams hovered about his couch, and hideous Nightmares lurked in the darkened corners. Sometimes the Dreams were sent out of this valley, by way of glittering ivory gates, to the earth,



where they warned mortals of coming misfortunes. See Morpheus.

Modern Application. The word somnolent, meaning drowsy or sleepy, finds its derivation in the name of this god of ancient mythology. To "be in the arms of Morpheus" implies deep sleep, induced by a narcotic sprinkled upon the face by the minister of

SONATA, so nah' tah, an instrumental composition consisting of three or four movements played in different rhythms, but related The typical four-part sonata in thought. begins with a brilliant allegro, then passes to a movement that is slow of rhythm and lyrical The third movement is light in character. and graceful, and may be a minuet or scherzo; the fourth is a brilliant finale. The first movement of a sonata has a definite form called sonata-allegro form. It consists of three sections-the exposition, the development, and the repetition. The modern sonata is the result of a gradual development in which various composers had a part. It was brought to its highest degree of perfection by Beethoven. A sonata written for the orchestra is called a symphony (which see). See, also, Music. SONG OF DEBORAH. See Debo

See Deborah;

JUDGES, BOOK OF.

SONG OF SONGS. See Solomon's Song. SONG OF THE LARK. See Breton,

Jules Adolphe.

SONNET, sahn' et, one of the most important and widely practiced of poetic forms, means in Italian "little sound." It was originally recited to the accompaniment of lute or mandolin. Its origin, whether in Provence or Sicily, is a matter of dispute, but that it flowered in thirteenth and fourteenth century Italy is clear. It reached perfection in the sonnets of Petrarch.

Widely practiced in Italy and France, the sonnet was admired by Sir Thomas Wyat and Henry Howard, Earl of Surrey, who endeavored, prior to 1550, to employ the form in English. Thereafter the sonnet with Spenser, Shake-speare, Milton, Wordsworth, Elizabeth B. Browning, and Rossetti became an important

The sonnet is a form of lyric poetry, more meditative and intellectual than a song. It is usually to some degree a comment on experience and may even be deeply philosophical. The character of its content determines its structure. It is composed of two parts, the octave of eight lines, and a concluding sestet of six lines. The octave sets forth the theme of the sonnet, its experience, emotion, or idea, and the sestet comments on what has been set forth in the octave. There is, therefore, a structural break at the end of the eight lines. It is as though the sonnet were composed of two paragraphs, one of eight and one of six lines. This is the structure of the Italian or

Petrarchian sonnet.

The sonnet, however else differentiated, consists always of fourteen lines of iambic pentameter verse. In the English adaptation of the Italian form, however, variations in the rhyme scheme of the original were developed, the most successful being that of Shakespeare, which consists of three quatrains and a couplet, the rhyme scheme being abab, cdcd, efef, gg. The Italian sonnet employed fewer rhymes, the purest form being abba, abba, cdc, dcd, or as a freer variant cde, cde in the sestet. The Italian form indeed permits any combination of two or three rhymes in the sestet provided it does not end in a couplet. The epigrammatic effect given by the couplet at the end of the Shakespearean sonnet is foreign to the effect aimed at in the Italian sonnet.

Not all sonnets in English fall into either the distinct English or Italian types. manner of rhyme schemes have been employed both in octave and sestet. The sonnets of Keats, for example, are of a mixed type. However, Wordsworth, Mrs. Browning, and Rossetti, those English poets who have been most studious of the sonnet form and most successful as writers of sonnets, have in nearly every instance taken no liberties or few with the Italian rhyme scheme.

SONS OF LIBERTY, the name adopted by an organization among the American colonists which actively opposed the Stamp Act (which see). It was not a single society with central control, but a group of patriotic associations which sprang up simultaneously in the various colonies, those of New York and Connecticut becoming strongest. Through committees of correspondence, the work of the different societies was coordinated. The chief mission of the Sons of Liberty was accomplished when the Stamp Act was repealed, in 1766, but they still opposed the importation of goods from England, and later favored independence.

Originally, they were of necessity secret societies, but later worked openly and had to do with many of the early movements toward separation, such as the calling of the Continental Congress. See Revolutionary War.

SONS OF SAINT GEORGE. See GEORGE, SAINT.

SONS OF UNION VETERANS OF THE CIVIL WAR, an American patriotic society, organized on September 29, 1879, in Philadelphia, Pa., the Anna M. Ross Camp No. 1, for a purpose similar to that of the Grand Army of the Republic (which see). The society is composed of lineal male descendants, over sixteen years of age, of honorably discharged soldiers, sailors, or marines who served in the War of Secession. The insignia of the society consists of a bronze badge suspended from a red, white, and blue ribbon for formal use; and for ordinary wear, a buttonhole decoration.

The Daughters of Union Veterans of the Civil War is a similar organization of women. SOO CANALS. See SAULT SAINTE MARIE

SOOT, a fine black substance deposited by smoke. It results from the imperfect combustion of fuel, such as wood, coal, or oil, and contains much carbon and ammonium salts. The large amount of nitrogen in the latter makes soot an excellent fertilizer, especially for cereals, grasses, and carrots. The soot nearest the fire is often a shining brown powder containing dried tar; it is used as a pigment under the name of bister. The blacker soot farther up the chimney, especially that from oil or resin, is the pigment lampblack. Soot adheres to anything with which it comes in contact; hence smoke blowing through a city deposits its soot upon the buildings in its path and makes them dingy. In London (which see) the damage from soot is estimated at several million dollars a year. In the worst cases, about three per cent of the coal burned is converted into soot. See Combustion; Smoke.

SOPHIA, so fi' ah, former Queen of Greece.

See Constantine I.

SOPHISTS, sof' ists, meaning men of wisdom, was the name given to wandering instructors in Greece in the fifth and fourth centuries B.C., previous to the rise of the schools of philosophy under Plato and Aristotle (see Philosophy). They taught disputation, rhetoric, and politics, taking fees from their pupils, and for a hundred years were almost the only schoolmasters of the Greeks. They had no uniform philosophy, but were, in general, skeptical and indifferent to truth. Their influence on literature and oratory was beneficial, but their insincere method of reasoning had a mischievous effect on conduct. They were despised by Socrates and his school, who taunted them with "selling wisdom" and with taking pride in "making the worse appear the Some of the most famous sophists were

Protagoras, Gorgias, Prodicus, and Hippias. SOPHOCLES, sof' o kleez (about 495-406 B.C.), a Greek dramatist, born at Colonus, a suburb of Athens. At the age of twenty-eight, he submitted his first play, Triptolemus, in competition with Aeschylus, and won first prize. He served in political offices as a patriot, rather than as a politician. In 440 B.C., he was chosen one of the board of generals in the war against the aristocratic party of Samos, was later general in the Peloponnesian War, and a member of the committee that reported on the proposed oligarchical constitution for the state. In his old age he held a minor priesthood, and at his death was given heroic

honors.

In talents and virtues, Sophocles was constantly offered as an ideal to the Athenian youth, and his whole life was an unusual com-

bination of grace, versatility, and success. He won prizes in youth, manhood, and old age; for a period of thirty-two years, he earned the first prize about twenty times, never falling to the third place.

Changes in the Drama. His dramas, of which seven out of the total number of 120 are extant (with fragments of others), represent marked development in dramatic technique.

He introduced a third actor, thus enlarging the scope of the action; increased the chorus from twelve to fifteen members and subordinated it to the main plot, thus making it essentially the ideal interpreter of the action; and completed each play in itself, instead of grouping three about a central theme, as Aeschylus and other dramatists had



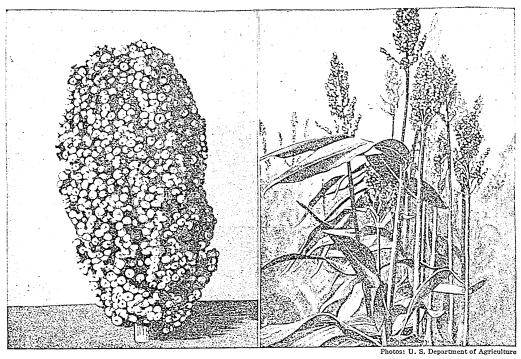
SOPHOCLES [From a bust in the Capitoline Museum, Rome.]

done. His style is characterized by elegance and beauty; his characters are Hellenic in their calm reserve, and human in the distinctness with which they are presented. In all there is a pervading sublime, religious reverence, and his conception of Fate is no longer the traditional one of making it a blind, external power, but something, instead, that results inevitably from character and circumstance. Sophocles, Aeschylus, and Euripides were the foremost dramatists in the golden age of Pericles.

Dramas That Are Extant. His Antigone is a problem play, revealing the tragedy of a conflict between the law of the individual conscience and the dictates of political authority. In Oedipus Tyrannus, he makes use of what has been called Sophoclean, or dramatic, irony, and shows how the hero Oedipus unknowingly but inevitably fulfills the oracle which has decreed that he should live in incestuous marriage with his mother, after slaying his father. The other plays that now exist complete are Ajax, Electra, Trachiniae, Philoctetes, and Oedipus at Colonus.

SORATA, so rah' tah. See Andes.

SORBONNE, sohr bon', a famous institution of learning in Paris, the outgrowth of a medieval college of theology. It has belonged to the city of Paris since the middle of the nineteenth century. The modern Sorbonne is housed in one of the finest university buildings in the world, dating from 1889 and known as La Nouvelle Sorbonne ("the New Sorbonne"). The institution maintains faculties of science



TWO VARIETIES OF SORGHUM White milo, at the left; white durra, at the right.

and literature and has splendidly equipped laboratories, lecture rooms, and libraries. The faculties of science and letters of the University of Paris have their headquarters in the Sorbonne building.

The old Sorbonne was founded in the thirteenth century by Robert of Sorbon, and was originally a hall of residence and study for poor theological students. In the course of time, the institution became one of the strongest theological schools on the Continent. In the seventeenth century, its buildings were reconstructed by Richelieu, who built a magnificent chapel for its students. Among the changes that occurred when the institution was reorganized after the French Revolution was the abolishment of the faculty of theology.

Many American students attend the Sorbonne on French scholarships.

SOREL RIVER. See RICHELIEU RIVER. SORGHUM, sawr' gum, a group of plants belonging to the grass family, one class of which contains a sweet sap from which syrup is made. The sorghums are tall, earless plants, bearing terminal heads of small seeds. The syrup-yielding plants are known as saccharine, or sweet sorghums, and the others as non-saccharine, or seed, sorghums. Kafir corn and broom corn, both of which are described under their titles in these volumes, are the best-known varieties of the non-saccharine class. The saccharine varieties are cultivated for

their sap, as forage plants, and as packing for

In the manufacture of syrup from sorghum, the stems are passed through roller mills, and the expressed juice is subjected to various processes of boiling, skimming, evaporation, filtration, and purification. The sap does not make good sugar, because of difficulty in purifying the juice. Refuse from the mills is fed to stock. Sweet sorghums are good drought-resistant crops, and are most widely grown in South Dakota, Kansas, Nebraska, Texas, Oklahoma, and regions to the southeast. About 31,800,000 gallons of sorghum syrup are produced each year in the United States. B.M.D.

White Milo, a variety characterized by slender stalks which attain a height of from seven to ten feet, or even more. The stalks produce a large number of leaves, and contain considerable juice. The heads are rather short, compact, and thick, and are borne on stems that are erect, pendant, or "goosenecked." White milo stools abundantly, and produces wide branches. Its seeds are white, large, and flattened on two sides. It matures fairly early, the first crops being ready for harvesting in from 70 to 110 days after planting.

White Durra, sometimes called Jerusalem Corn. has during recent years been replaced gradually by better varieties of grain sorghums. The stalks are rather slender, and attain a height of from four to eight feet. Like most of the durras, the white contains little juice, and produces such a scant number of leaves as to be considered of very low value for

forage purposes. A large percentage of the heads curve or turn down on the stems. They vary from six to ten inches in length, and are broad, thick, egg-shaped, and fairly compact. The kernels, as well as the hairy glumes, are almost white, and are large and strongly flattened on two sides, being almost broad wedge-shaped. The grain has been used for chicken feed with much success. Seed ripens in a comparatively short time, depending upon weather conditions. Crops usually mature in from 75 to 100 days after planting.

SORORITY, from the Latin word for sister, is the name applied to a Greek-letter society for women students in colleges and universities, corresponding to the fraternity for men. In all essential respects, the aims and organization of the two are identical.

Development. As a higher education for women became popular, they began entering the universities to share the educational advantages of their brothers. It was only natural that they should come to feel the same need of sympathetic companionship, and of a definite outlet for their social desires, as the men had felt and had met through the organization of their fraternities. The latter furnished a ready-made model after which the

women could pattern.

The first secret society for women was the Adelphian, which, in 1851, was organized at Wesleyan College, Macon, Ga. Although this did not begin existence under a Greek name, it followed the fraternity idea in its other features, and in 1905 the name itself was changed to Alpha Delta Pi sorority: Kappa Alpha Theta is usually spoken of as the first sorority, since it was the first to use the Greek letters; it was founded at DePauw University in 1870. In the same year, Kappa Kappa Gamma was started at Monmouth College, in Illinois.

Several of the honorary fraternities admit women as well as men to membership. Among these are Phi Beta Kappa, the oldest of the honorary fraternities; Sigma Xi, a research organization confined to students following scientific lines; Phi Kappa Phi; and Alpha Omega Alpha.

Organizations of high-school girls and of women for social purposes are also sometimes

known as sororities.

Related Subjects. The reader is referred in these volumes to the following articles:

Fraternity Phi Beta Kappa College

SORREL, the name applied to several plants belonging to the buckwheat family, whose juicy leaves and stems contain oxalic acid and have a sour taste. In Europe, particularly in France, some species are cultivated extensively for use in soups, salads, and for greens. The common American species is a low-growing plant with three-lobed, arrowshaped leaves, and spikes of small white. pink, or yellow flowers. Sheep sorrel, sour sorrel, and red sorrel are some of the names for this plant, whose pleasantly acid leaves the children like to chew. The last-mentioned name refers to masses of three-angled, reddish seeds borne by the plant. Since the sheep sorrel is a weed that grows well in acid soil, its presence in a meadow indicates that the land is in need of lime.

Classification. The sheep sorrel is classed as Rumex acetosella, family Polygonaceae.

SORREL TREE, OR SOURWOOD, a beautiful tree of the heath family, growing plentifully in the woods of the Southern United States, and also found as far north as Pennsylvania, Indiana, and Ohio. The names refer to the taste of the leaves and twigs, which hunters and woodsmen sometimes chew to quench their thirst, sorrel being derived from an Old French word meaning sour. The tree often reaches a height of fifty to sixty feet, and has reddishgray bark and smooth, oblong leaves. In summer it bears graceful clusters of small, white, bell-shaped flowers, which are followed by little, downy capsules. In spring the foliage is bronze-green, but in autumn it turns a brilliant scarlet. The wood is used for turning articles such as tool handles and bearings for machinery, while the leaves furnish a black

Scientific Name. The sorrel tree belongs to the family Ericaceae. Its botanical name is Oxydendrum arboreum.

S O S. See RADIO COMMUNICATION; SIG-NALING AND SIGNALS.

SOTHERN, EDWARD HUGH (1859-1933), an American actor, born at New Orleans, La. His father, also an actor, was opposed to his

child's following the same profession, and therefore took the boy to England at the age of five, and began to train him in the fine arts, especially painting. In 1879, however, Edward refused to continue art work, and commenced his theatrical career in New York. He toured America and England with John McCullough, but met with little success until 1884, when he be-



E. H. SOTHERN

came leading man in Sardou's Scrap of Paper and other popular dramas. Three years later, he took the most important rôle in The Highest Bidder, an old comedy found among his father's

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Sothern's work was heartily praised by the critics, and Daniel Frohman, the New York theater manager, engaged him for a long term of years. In this period of his career, he made notable successes of such plays as Belasco's Lord Chumley; The Prisoner of Zenda, adapted from Anthony Hope's novel; and Justin Mc-Carthy's If I Were King. In 1900 he began his acting of Shakespearean tragedies, and soon associated Julia Marlowe with him in productions which for years set the American standard for such plays. Sothern married Miss Marlowe in 1911 (see Marlowe, Julia). He published his autobiography in 1916.

SOU, soo. See Franc. SOUDAN, former spelling of Sudan (which see)

SOUL, Transmigration of the. See Trans-MIGRATION OF THE SOUL.

SOULÉ, soo la', Pierre. See Ostend Man-

SOUND. If you touch a gong while it is sounding, you can easily feel that it is vibrating, and if you press against it to stop the vibrations, you bring the sound to a sudden end.



RIPPLES ON WAVES

As waves enlarge in circles from the point where disturbance occurs, so do sound waves travel from the exciting cause. [See illustration of waves of sound, elsewhere in this article.]

The to-and-fro movement of the gong is the cause of what you hear. As the sides move outward, they compress the air in all directions, and as they swing back, they allow the air to expand; each particle of air presses against the particles beyond it, then draws back, and so the atmosphere about the gong is formed into a series of globular shells alternately of compressing and of expanding air. When these reach the air in your ear, the changes of pressure on your eardrum send the sensation of sound to your brain.

How Sounds Differ. Since the surges of air against the eardrum are the cause of sound, it is plain that whether a noise is loud or soft, high-pitched or low, pleasant or unpleasant, must depend upon the characters of the sound waves and of the individual ear.

Loudness. If you put your feet down gently when you walk, you move quietly; if you stamp, a loud noise results. The greater the force you exert, the stronger the compression which the resulting vibrations produce, and the more intense the effect upon your ear. The tramp of soldiers marching is louder than the noise from one person's feet, because the simultaneous waves from sources close together combine their force. But sometimes two sounds result in no sound, for if the compression from one meets an equal expansion from another, the waves at that point cease. Thus, if you turn a tuning fork slowly around near your ear, you will find four positions in which you cannot hear it, unless you hold something between one of the prongs and your ear.

If you hear four trumpets blown 100 yards away, the sound seems to you about as loud as that from one trumpet fifty yards away, for when the one source of waves is twice as far from you as is the other, the spherical surface of a wave from the first is four times as great as the surface of one from the second, and it contains four times as many particles to share the energy of the sound. The scientific statement of this law is that the intensity of a sound varies inversely as the square of the

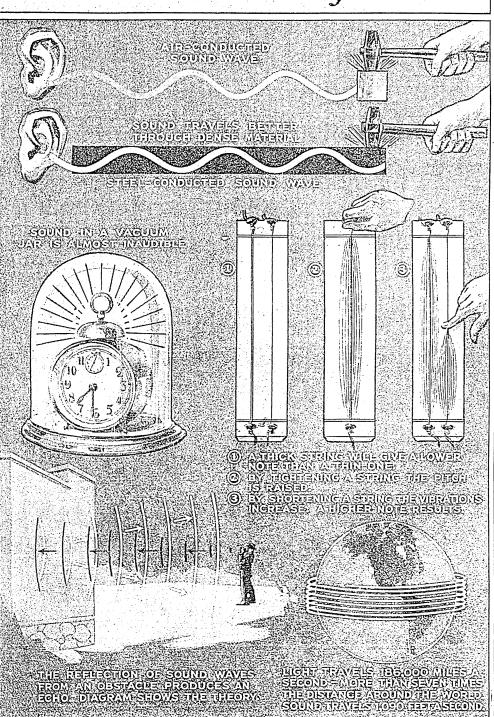
distance from its source. Most of us have tried the experiment of holding a watch between the teeth or pressing it against the forehead. At each vibration caused by the ticking, a wave of compression and expansion travels through the bones of the head just as it would through the air. In fact, the denser the object, the better, as a rule, will it transmit sounds. The reason will be plain to anyone who has played with pool balls; if half a dozen balls are placed in a row, all touching, a slight tap at one end will move the ball at the other end, but if the row is formed with space between the balls, the first one must be hit quite hard in order to affect the last. The denser a substance, the closer together are its particles of matter, and a sound, therefore, will travel through steel or wood, or even through water, better than through air, but will not progress at all in a vacuum.

Why is it, then, that the walls of a house soften the noises of the street? The reason is that, when sound waves traveling in one medium meet the surface of another, they are partly reflected, just as light is mirrored by a transparent pane of glass. Nature has taken advantage of this law in giving rabbits and other animals ears which they can hold erect to gather in a greater volume of sound; each wave impulse that strikes the wall of the ear at an angle is reflected inward at an equal angle, and so reaches the eardrum.

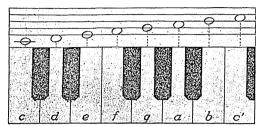
reflection is also responsible for echoes.

High Tones and Low. The rapidity with which an object vibrates is what determines the pitch of the sound given out. Thus a

Some Properties of Sound



soprano, to sing high C, must send out four waves from her vocal organs in the time that a contralto singing middle C gives out one. The actual number of vibrations for middle C, whether sounded by human vocal cords, piano strings, or wind instruments, is 256 per second. The ear takes note of sounds containing as many as 30,000 vibrations a second, but does not recognize a tone where the number of vibrations is fewer than 30. Probably, the



SCALE OF "C" ON THE STAFF AND KEYBOARD

average ear does not hear sounds whose vibrations exceed 15,000 or 16,000. Many insects make sounds of so high a pitch that they can-

not be heard by the human ear.

The conditions which regulate the rate of vibration of any object are nearly all known, and our knowledge of them is utilized in making and in tuning musical instruments. Thus the low strings on a mandolin are thicker than the high strings, for to double the weight of a string halves its number of vibrations. To raise the pitch of a string, you tighten it, doubling the number of vibrations if you quadruple the tension, and to play a high note, you shorten the string with your finger, doubling the number of vibrations if you halve the length. The same laws govern other stringed instruments and the drum. The pitch of wind instruments depends on their length, and on whether or not they are open or closed at the ends.

Noise or Music. If we leave out of consideration the differences in personal likes and dislikes, the only distinction between musical and unmusical sounds is that the former have regular, the latter irregular, vibrations. A confusion of sounds makes noise, for the various sound waves mingle and cause the ear to receive a jumble of sensations. If you stand on a hill above a city, or high up in a skyscraper, you find many of the sounds of the city, which below are so disagreeable, to be distinct musical tones; but, as in music, notes which separately are pleasant may produce discord if sounded together.

Discord in music seems to be due to what are known as *beats*. If you strike any two adjacent piano keys simultaneously, you can distinctly hear throbs in the sound. The waves from the two notes start at the same instant, but because the upper string vibrates faster

than the lower, its first push against the air is completed sooner, and it starts to draw back while the other is still moving outward. It starts its second push still farther ahead, and continues to gain until after a time an instant comes when the expansive force of one exactly balances the contractive force of the other, and there is silence. The next instant, the one wave has gained on the other again, and with the two once more moving in the same direction, the sound surges out with doubled intensity. Since a beat occurs only as often as one wire has made a complete vibration more than the other, there will be as many beats per second as the difference between the number of vibrations each makes. Notes which sound about thirty beats per second make the most disagreeable combination; above and below that number the unpleasantness gradually decreases, and seventy or more beats per second are not noticeable. When notes differing more than seventy vibrations produce discord, as do C and the B above it, there are beats with or between the overtones. Piano-tuners always listen for beats.

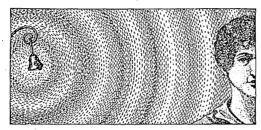
Quality of Sound. Overtones are the notes produced when an object vibrates not only as a whole, but also in parts. If you rest a small piece of paper on the center of a violin string, it will not be thrown off while the string is vibrating, for while the left half moves up, the right half moves down, and the center is motionless. Thus, while the whole string is producing the fundamental note, each half is producing a note an octave higher, called the first overtone. By vibrating in thirds also, the string sounds another overtone, in fourths another, and so on. Overtones are very important in music, for, as proved by Helmholtz, their number and strength determine quality of tone.

Sympathetic Vibration. If you hold down the loud pedal of a piano, so that all of the wires are free to vibrate, and sing a note into the wires, they will send back the same tone with so much realism that they seem to be mocking you. This is because the waves from the fundamental and overtones of your voice set in motion the wires which are of the proper length, tension, and thickness to sound them. Sometimes a certain note on a piano will cause windowpanes to rattle, and sometimes glass is broken by vibrations set up by music. On the other hand, it is because of sympathetic vibration that an old house gives to music such a mellow sound.

Speed of Sound. Nearly everyone has tried the experiment of counting between a stroke of lightning and the peal of thunder which follows, to learn how far away the flash occurred. If you count in seconds and divide the result by five, you will have an approximately correct idea of the number of miles, for sound travels through the air about a fifth of a mile in a second, and light covers 186,300 miles in a second, which for practical purposes is an instantaneous rate. The temperature of the air affects the speed of sound; at the freezing point it is about 1,000 feet per second, and increases about two feet for every degree Centigrade, or a little over one foot for every degree Fahrenheit. Sounds travel faster in liquids and solids than through the air. Through water its speed is 4,700 feet per second; along steel wire, 15,700 feet per second.

[See illustration, in the article Есно.]

When There's No Ear to Hear. If the sound waves of the air do not reach the ear, is there sound? Imagine a tree falling a



HOW SOUND WAVES SPREAD

If sound waves could be seen, they would appear as an ever-widening circle, moving from the exciting cause. As a matter of fact, they have been both seen and photographed, and they are as real as a widening circle of ripples on water. If the exciting cause be violent, as when a cannon is fired, the force of the waves of sound may destroy the eardrum.

hundred miles from a human being, or as far from one of the lower animals, or any other form of animal life. Would it make a sound?

The answer to such questions depends on our definition of sound. If we think of sound as a sensation, then there would be no sound. But if we think of it as that which can cause the sensation, then there would be sound. Physicists always regard sound in the latter sense.

How the Radio Set Transmits Sound. The waves that carry wireless messages through space are electromagnetic radiations of the same nature as visible light. In the studio of the broadcasting station, the sounds of voices or instruments enter a microphone, which reproduces, in the form of electrical pressure, the variations of air pressure produced by the sound waves. Wires carry the electrical impulses to a transmitting apparatus, in which they are transformed into electromagnetic waves that are sent into the ether through a system of wires called an antenna. These radio waves, traveling outward in all directions at the rate of 186,300 miles per second, are collected by an antenna that transforms them into alternating electrical current. A detector changes the alternating current into direct current, and another device changes the

electrical impulses into sound waves that the ear translates as words or music.

A striking instance of the difference in the rates of travel of sound waves and radio waves may be seen in the following example. A speaker addressing a large audience in California may be heard by a listener in New York before he would be heard by those in his immediate audience. His voice, carried by electricity at the rate of 186,300 miles per second, would travel 3,000 miles before the sound waves would travel 100 yards. See Radio Communication.

Problems. (1) To illustrate intensity of sound:
A hears a sound at a distance of 10 feet, and B at
a distance of 50 feet. Which one hears the sound
more loudly, and how much more loudly?

SOLUTION

Intensity of sound varies inversely as the square of the distance. Hence A hears the sound as much more loudly than B as the ratio of 50^2 to 10^2 , or 2,500 to 100. Therefore the sound seems $\frac{2,500}{100}$, or $\frac{25}{100}$, times as loud to A as to B.

(2) To illustrate speed of sound:
Assuming that sound travels in air at the rate of 1,090.5 feet per second at o° C., at a temperature of 25° C. what distance away would a lightning flash be

25° C. what distance away would a lightning flash be from a person hearing the thunder 6 seconds after the flash?

SOLUTION

Increase of speed of sound being 2 feet per second for every Centigrade degree, in this case the speed increase is 2×25 feet per second, or 50 feet per second. Then the thunder reaches the listener's ear at the rate of 1,090.5 feet per second plus 50 feet per second, or 1,140.5 feet per second.

Time between flash and sound being 6 seconds, the flash was 6×1,140.5 feet away, or 6,843 feet.

(3) A person sets his watch by a whistle which blows at 12 o'clock. The whistle is 1 mile away and the temperature 20° C. How many seconds will the watch be incorrect?

SOLUTION

Increase in speed = 2 feet per second for each degree C., or 2×20 feet, or 40 feet. Speed of the sound per second is therefore 1,090.5 feet+40 feet, or 1,130.5 feet. If the sound travels 1,130.5 feet in 1 second, it travels for $\frac{5.280}{1,130.5}$ seconds, or 4.67 seconds (approximately), before the person hears it one mile away. Therefore he will set his watch 4.67 seconds slow.

(4) At o° C. the speed of sound through iron is 5,127 meters per second, and through air, 332.4 meters. A blow is struck at one end of an iron rail. A person stationed 3,418 meters down the rail hears two sounds, one carried through iron and one through air. What is the interval between the sounds, temperature being o° C.?

SOLUTION

 $\frac{3,418}{5,127} = \frac{2}{3}$ or 0.67, approximate number of seconds it takes the sound to travel through the length of iron rail.

 $\frac{3;418}{332.4}$ =10.28, approximate number of seconds for the sound to travel through air.

10.28-0.67=9.61. Therefore the person hears the sound through the rail 9.61 seconds before he hears it through air.

Related Subjects. The following topics in these volumes may be consulted in connection with this article on sound:

Acoustics Ear Echo Harmonics Light Music

SOUNDING, the process by which water depths are determined. In very early times, attempts were made to find the depth of water for the purpose of aiding navigators, but it was not until the nineteenth century that instruments were invented which could be successfully used for deep-sea sounding. The introduction of submarine cables made necessary a detailed knowledge of the contour of the ocean bed, and greatly stimulated efforts to perfect a satisfactory sounding machine. The simplest sounding device is the plummet, a lead shaped like a window weight, to one end of which a stout cord is attached. It is thrown into the water, and as it sinks it draws the cord with it, which, being marked in feet, shows the depth. See Plummet; Lead, Sounding.

The plummet was replaced by a diving rod, which is a hollow cylinder with valves at the top and bottom, opening and closing so that a specimen of the bottom may be carried up. For deep-sea and scientific purposes, a larger sounding machine has been developed. It consists of a device which carries nearly 6,000 fathoms of wire rope, and is fitted with two brakes, one for holding the reel and the other for stopping it when the weights strike the bottom. As the wire passes over a registering wheel, the amount let out is indicated on a dial.

The development of the science of measuring distance by vibrations of sound had a marked effect upon deep-sea sounding. During World War I, this method was used to detect and locate submarines. The principle worked on is that a sound starting at or near the surface of the water travels through the medium of water at a known average speed until it hits bottom or something solid, and then it is reflected back as an echo. This method has not been perfected, but studies are being made to determine the exact velocity of sound in water instead of the average, which is 4,700 feet per second. The effect of salinity, and an accurate means of determining the time between the original sound and its echo, are the principal points of investigation.

SOUR CLOVER. See MELILOT. SOUR GUM. See PEPPERIDGE.

SOURIS, soo' ris, RIVER. See Assiniboine River; North Dakota (Rivers and Lakes); Saskatchewan (Surface and Drainage).

SOURWOOD TREE. See SORREL TREE. SOUSA, soo' zah, John Philip (1854-1932), the most famous composer of band music America has produced. He was also renowned

as a bandmaster. Sousa's genius for composing stirring melodies for band organizations won him the title "the March King." He was born in Washington, D. C., and studied music there, making a specialty of the violin and becoming conductor of an orchestra at the age of seventeen. From 1880 to 1892, he conducted the United States Marine Corps Band, which, under his leadership, became famous. It was especially in demand to play

the spirited, tuneful marches which its leader was then beginning to compose. Sousa founded his own band in 1892, and during the next eight years, the organization gave concerts all over the United States and Canada. Between 1900 and 1905, Sousa and his band made four tours of Europe, and in 1910 and 1911, a tour of the world. Many honors were bestowed upon the



Photo: U & U

JOHN PHILIP SOUSA

leader, among them the Palms of the French Academy, the rank of Officer of Public Instruction by the French government, and the Grand Diploma of Honor by the Academy of Hainaut, Belgium.

Sousa was selected to organize bands at the Great Lakes Naval Training Station, in Illinois, after the United States entered the World War. He was also made an officer in the United States navy, with the provisional rank of lieutenant. In 1923 the University of Marquette conferred on him the degree of Doctor of Music. The radio broadcasts of his band added to his popularity.

His Principal Works. Sousa's collection entitled National Patriotic and Typical Airs of All Countries has been officially adopted by the United States Navy Department. His numerous popular marches include The Washington Post, El Capitan, Liberty Bell, Hands Across the Sea, High School Cadets, and the universally popular Stars and Stripes Forever. He also wrote light operas, descriptive suites, and a symphonic poem. His literary works include the novels The Fifth String and Pipetown Sandy, and a descriptive book, Dwellers in the Western World.

SOUTH AFRICA, UNION OF. See UNION OF SOUTH AFRICA.

SOUTH AFRICAN RAILWAYS. See Union of South Africa.

SOUTH AFRICAN WAR (1899-1902), a struggle for supremacy in South Africa between the British government and two Boer republics—the South African (now the Transvaal) and Orange Free State. This war grew out

of the jealousy and ill-will existing between the Boers, or Dutch settlers, and the foreigners, or Uitlanders, most of whom were British sub-In 1884 gold was discovered in the Transvaal, and the large influx of Uitlanders to the district served greatly to disturb the placid Boers. The latter, who believed that the Uitlanders hated them and would seek to gain political control of the government, put forth every effort to check such a plan. Under the leadership of their president, Paul Kruger, they so modified the naturalization laws that in 1887 the term of residence necessary for securing citizenship was fixed at fifteen years. The foreigners protested against this and other restrictions as unjust, and in 1896 the opposition took concrete form in an armed uprising known as Jameson's Raid.

Negotiations between the British government and that of the South African Republic failed to secure a peaceful solution of the difficulty, and in October, 1899, war was declared, the Orange Free State joining with its sister republic against the British. At the outbreak of hostilities, an army of 12,000 British troops was stationed in Natal, and small detachments were posted at Kimberley, on the western frontier of Orange Free State, and on the Bechuanaland and Rhodesian borders. The Boers swarmed into Natal and shut up the British force at Ladysmith. The English troops under General French (later Earl of Ypres) checked the Boer advance into Cape Colony, and Lord Methuen opened the way to Kimberley. The British then met with a series of discouraging reverses, but in January, 1900, reinforcements arrived under Lord Roberts, Lord Kitchener acting as his chief of staff.

A new campaign was immediately begun. On February 27, the Boer general, Cronje, surrendered to Lord Roberts at Paardeberg in Orange Free State, and the following day a final and successful attempt raised the siege of Ladysmith, where for months the British troops had been suffering from disease and starvation. British advances were made in the northern part of Cape Colony, and on March 13 Lord

Roberts entered Bloemfontein, the capital of Orange Free State, and the republic was proclaimed British territory.

After encountering the Boers under General Louis Botha, on the Vet River, Lord Roberts crossed the Vaal and entered the city of Johannesburg on May 31. Five days later, he took Pretoria, the capital of the South African Republic, and President Kruger fled to the Portuguese territory in the east. The British forces in Natal pushed north, driving the Boers before them, and united with Lord Roberts in a drive against General Botha, who was forced east into the mountains and surrendered on Portuguese territory, in September, 1900. The South African Republic was then declared British territory, under the name of the Transvaal.

The rest of the struggle was characterized by guerrilla warfare; but the Boer leaders, one after another, were defeated, and the final surrender was made in May, 1902. The total Boer enlistment did not exceed 95,000, while the British forces numbered nearly 200,000.

The terms of peace, signed at Pretoria, May 31, 1902, provided that the Boers surrender all arms and munitions and swear loyalty to the British sovereign, Edward VII. In return, all prisoners outside of the colony were to be brought back to their homes, and no proceedings were to be taken against the burghers for action in connection with the war. Civil administration was to succeed the military government as soon as possible, and be followed by representative government; the Dutch language was to be allowed in courts of law and be taught in schools; a sum of \$15,000,ooo was to be granted to aid in the restoration of property. Since 1910, the Transvaal and Orange Free State have been self-governing provinces of the Union of South Africa.

Related Subjects. Further information on various phases of this subject may be gained in these volumes from the following articles:

Boer Botha, Louis Great Britain Jameson, Leander Starr Kimberley Kitchener, Horatio H. Kruger, Stephanus J. P. Rhodes, Cecil John Roberts, Frederick S. Union of South Africa



continents into which the earth is divided. With North America it forms what is known as the New World, a name adopted after the discovery of these continents by Europeans and

the spread of European conquerors and settlers to their shores following 1492.

The southern continent together with Mexico, Central America, and the West Indies is called Latin America, because of its occupation

and domination by Latin nations of southern Europe in the past and by their culture and language at the present time. Spanish is the official language of eighteen Latin-American nations, Portuguese the official language of Brazil, and French the official language of Haiti. These twenty nations are independent politically and different economically from Europe and the United States. Only small islands and bits of the mainland are held

as colonial possessions by northern nations.
Size and Location. South America is irregularly triangular in shape, like North America, with its widest extent in the north and its apex in the south. It has an estimated area of 7,700,000 square miles, and occupies nearly one seventh of the total land area of the globe. Its greatest length from north to south is about 4,800 miles and its greatest width 3,300 miles. A major part of its area is within the tropics, but it also extends beyond the tropics farther toward the South Pole than any other continent. South America is only slightly smaller than North America, but contains less than half as many inhabitants.

The People. South America's 91,300,000 people represent a number of races. First, there are the descendants of the native Indians who were in possession of the continent when Europeans discovered it. These people were, and still are, divided into numerous tribes, speaking different languages and having various degrees of civilization. Then there are white people descended from Spanish and Portuguese colonists, few in number but influential. There are also Negroes descended from African slaves. There are modern immigrants from Italy, Spain, Germany, and other countries, and in many cities business men from Europe and the United States. Finally, there are people of mixed blood, more numerous than any of the others, arising from intermarriage between the others, particularly between Spanish colonists and In-

Color lines are not sharp, but there are pronounced social, economic, and political contrasts between groups, so that democratic equality is an ideal rather than a present reality in many of the nations which occupy the continent.

Physical Features

6698

Plains and Mountains. Looking at a physical map of South America, it is evident that shape and size are not the only points of resemblance with North America. The most striking feature is the great mountain system that extends along the western side, forming the backbone of the continent. This mountain system is known as the Andean Cordillera, or the Andes. In height it is second only to the Himalayas of Asia among the mountain systems of the world, and its loftiest peak, Aconcagua, is 22,834 feet above the sea. There are several active volcanoes of gigantic size, of which the highest is Chimborazo, 20,498 feet, near the equator. There are also fertile plateaus inhabited by large groups of people, mainly Indians, who have a well-developed culture and support themselves by farming.

Between the Andes and the Pacific Ocean for a distance of 4,000 miles are narrow plains paralleling the sea, discontinuous and nowhere exceeding a hundred miles in breadth but nevertheless important. Toward the extremities of the continent these lowlands are drenched with rain, forested, and sparsely inhabited; but in the middle section of the coast they are desert lands made productive by the use of mountain streams for irrigation and by exploitation of mineral resources, and containing many inhabitants of Indian, white, and mixed blood.

To the east of the Andes great lowland plains extend toward the Atlantic, and, as

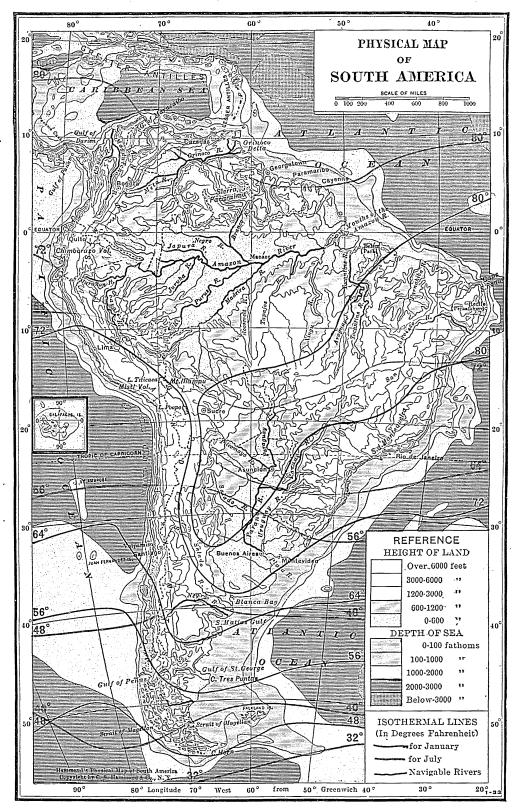
in North America, there are low mountain regions near the Atlantic Coast, known as the Guiana Highlands and the Brazilian Highlands.

The lowland plains, which occupy nearly two thirds of the continent, are divided by the highlands into three distinct regions. The central region is the basin of the Amazon, an extensive plain with a rainy equatorial climate and covered with dense tropical rain forests. This whole area is thinly inhabited by people who hunt and fish, or who gather such forest products as rubber and Brazil nuts.

North of the Amazon Basin and partly separated from it by the Guiana Highlands is a second lowland region, also tropical but covered with grass and having a long season of drought as well as a season of rain. These tropical grasslands, known as *llanos*, support some cattle of low grade and are sparsely settled by ranchers.

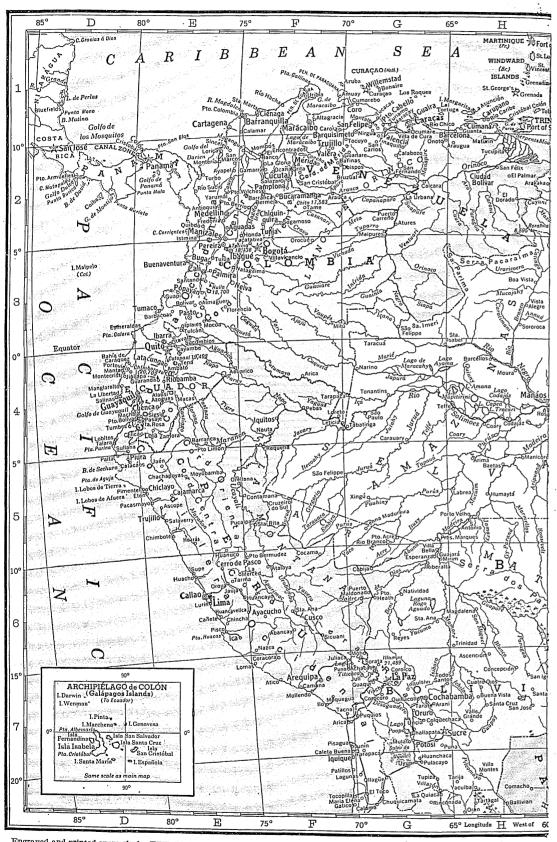
South of the Amazon Basin and partly separated from it by the Brazilian Highlands is the third lowland region, extending beyond the tropics into middle latitudes. This region is more important than either of the others because it contains the fertile temperate plains called the pampas, which produce enormous quantities of food crops and livestock for export to Europe and support millions of white people, many of them immigrant farmers from southern Europe.

One of the two eastern highland regions, that of Guiana, is unproductive, inaccessible, and sparsely populated. The other, that of Brazil,



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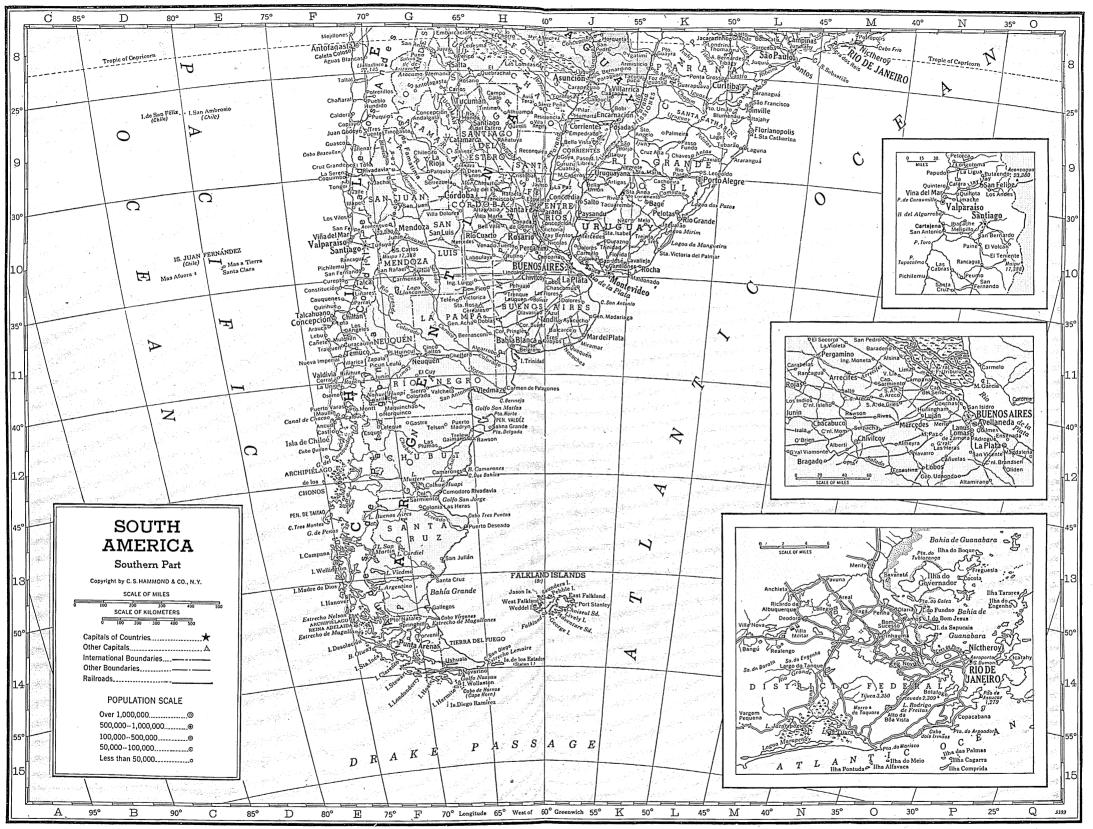
See How To Read a Map, opposite page 1, Volume A



M N 2 BARBADOS (8r.) SOUTH **AMERICA** 0 Northern Part Copyright by C.S HAMMOND & CO., N.Y. E SCALE OF MILES 0 200 300 SCALE OF KILOMETERS 0 100 200 300 400 500 Other Capitals.. International Boundaries... Other Boundaries. Railroads SURINAMS FRENCH POPULATION SCALE Over 1,000,000... 500,000-1,000,000... 100,000--500,000...... 50,000-100,000----Less than 50,000.... Equator 359 "Greenwich .T

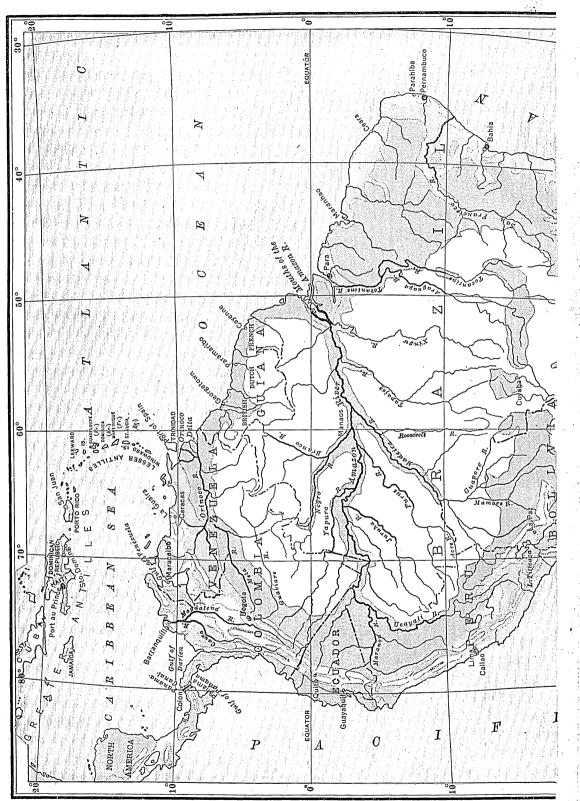
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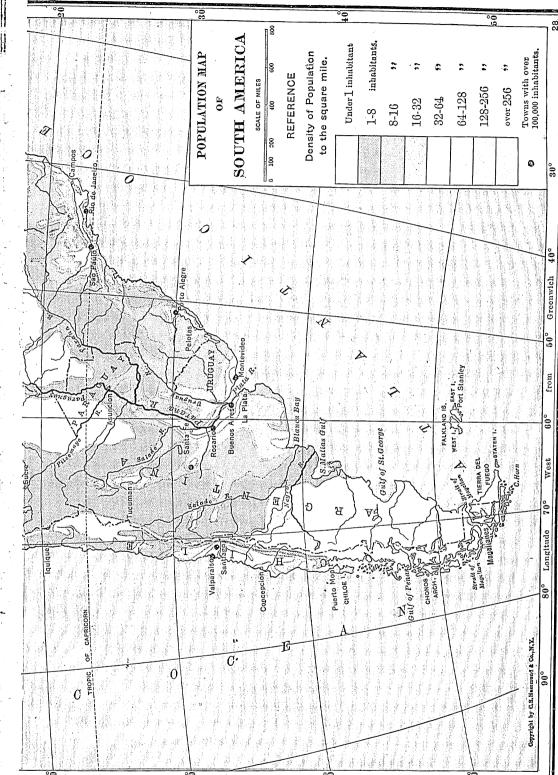
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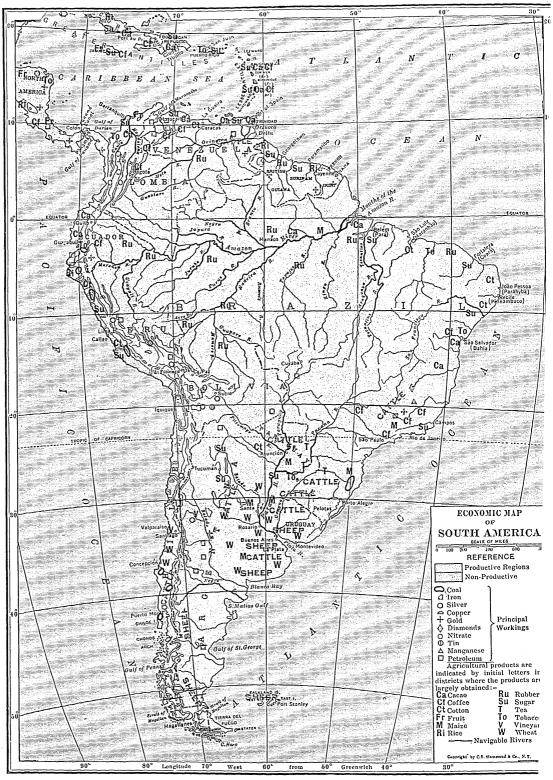
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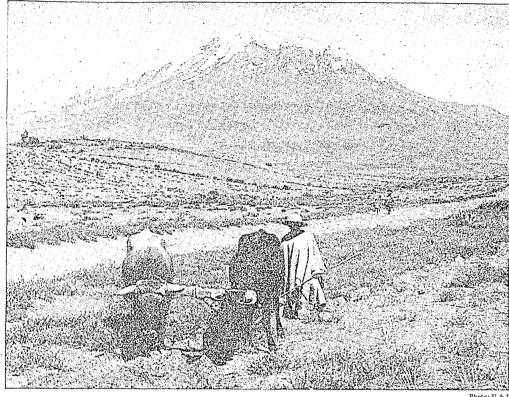


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See How To READ A MAP, opposite page 1, Volun



VIEW ON A PLATEAU OF THE ANDES An Indian farmer (foreground); the snow crest of Volcano Chimborazo rising above the plateau.

consists, on its inland side, of sparsely populated grasslands, called campos. But its seaward side, near the Atlantic, is fertile, accessible, and inhabited by more people than any other region of South America: people of Portuguese, Negro, and mixed blood, and immigrants from Europe; and it produces such specialized tropical and subtropical crops as coffee, cacao, sugar, and cotton.

Coast Line and Islands. With the exception of the southern portion of the western coast, which is indented by numerous fiords and is bordered by islands, the coast line of South America is remarkably regular. However, small indentations have formed famous harbors, such as those of Rio de Janeiro on the east coast, Valparaiso on the west coast, and Cartagena on the north coast. There are numerous other ports serving the needs of trade.

Few islands belong to the continent. Those worthy of mention are Trinidad off the northern coast; Tierra del Fuego, separated from the southern tip of the mainland by the Strait of Magellan; the Falkland Islands, east of the southern tip; and the Galapagos Islands at the equator, west of the continent.

Rivers. South America contains the Amazon, the largest river system in the world,

which drains nearly one-third of the continent and carries an enormous volume of water from the Andes and the central lowlands to the Atlantic. To the north is the Orinoco River draining the *llanos*. To the south is the Rio de la Plata fed by the Paraná, Paraguay, and Uruguay rivers, draining the southern lowland plains. Lines of transportation and settlement are provided also by many smaller rivers, such as the Magdalena flowing to the Caribbean Sea, the Guayas to the Pacific, and the São Francisco to the Atlantic.

Lakes. In contrast with North America, the southern continent contains few large lakes. The largest is Titicaca in a plateau of the Andes. It lies at an altitude of nearly two and a half miles above the sea, covers an area of 2,664 square miles, and has a maximum depth of 700 feet.

Climate. All of the continent north of Rio de Janeiro lies within the tropics, while the southern portion is in middle latitudes. In contrast with North America, seasonal changes of temperature are nowhere extreme, on account of tropical and oceanic relations. The tropical lowlands are always hot, the tropical highlands always cool, and the middle latitude areas generally moderate in temperature. In

rainfall, however, there are greater extremes than in North America, both from season to season and from place to place: within the tropics the never rainy desert of the Pacific low-lands, the never dry forests of the Amazon lowlands, and the alternately wet and dry grasslands of the *llanos* and *campos*; near the southern tip of the continent, cool rainy slopes on the Pacific side and dry lands on the Atlantic side of the Andes; and a little farther north moderate rainfall both on the Pacific side and

in the pampas on the Atlantic side. The seasons are the opposite of those in the northern hemisphere, summer occurring in December, January, and February; and winter in June, July, and August.

Vegetation. The rainy tropical lowlands are covered with luxuriant vegetation representing a large number of species, some of which grow to gigantic proportions. The tropical forests called selvas extending over most of the Amazon Basin constitute the greatest continuous forest area in the world. These forests of tall trees and vines are crowned by a thick evergreen canopy of leaves shading the ground so completely that

undergrowth is not dense and the interior of the forest appears open, although forest fringes along streams and clearings are nearly impenetrable. This type of vegetation arises under conditions of constant heat and moisture characteristic of the rainy equatorial climate.

Among the many different kinds of trees in the rain forests are some which provide valuable commodities: rubber and other gums for special uses; Brazil nuts; and cinchona, the source of quinine. These do not grow everywhere in the forest; the number of different kinds of trees is very great and each kind is more or less localized in its distribution. Palms and bamboos are conspicuous in some places, particu-

larly where the climax forest of large trees is not fully developed. Mahogany and other cabinet woods are more common in tropical forests of less extreme moisture conditions than in the typical rain forest.

Northward and southward from the equatorial rain forests are different types of vegetation under conditions of less moisture or less heat: tropical forests in which trees shed their leaves in a short dry season, bushy woods and grasslands in areas having a long dry season,

bushes and grasses of other kinds in the cool zone above the tree line in the Andes, and forests and grasslands of middle latitudes extending toward the southern tip of the continent. In certain places there are plants of special value: yerba mate, from the leaves of which a beverage called Paraguay tea is produced; Paraná pine for lumber in subtropical forests; and grass for livestock grazing both within the tropics and in middle latitudes as far south as the Strait of Magellan.

In addition to useful wild plants there are many cultivated plants grown by settlers in every region, appropriately selected with reference to the nat-

ence to the natural conditions under which they have to grow: for example, bananas in rainy tropical low-lands, coffee in low plateaus, and wheat in high plateaus and middle latitude lowlands. Some cultivated crops, such as wheat, have been introduced from other continents; others, such as potatoes, have been developed from wild plants by prehistoric inhabitants of South America.

Animal Life. South America has a variety of animal life, different in many particulars from that of North America. The southern continent not only contains a great number of species, but possesses many species of animals that are not found on any other continent. Some common animals, such as wolves, however, are



LUXURIANT VEGETATION AT THE EDGE OF EQUATORIAL FOREST

Photo: Visual Education Service

not found there. About one fourth of all the mammals known occur in South America. There are several families of monkeys, two of which differ from those of the Old World. A group of mammals peculiar to this continent consists of toothless animals, such as vampire bats, sloths, anteaters, and armadillos. The largest of the native mammals is the tapir.

The most powerful of the flesh-eating animals is the jaguar, the only formidable beast of prey in the continent. Almost all of the large wild animals of Asia and Africa are missing. Yet the tropical regions have been called a jungle paradise of small animals and of gorgeously plumed birds, including flamingoes, toucans, egrets, humming birds, and a great variety of parrots. Insects are numerous and include many species of large and brillianthued butterflies. The beetle family is well represented, some species being much larger than those found in other regions. Among the reptiles are alligators, boas, and turtles. The rivers teem with fish, and the number and variety are greater than in North America.

In addition to wild animals there are of course many domestic animals in every region. Horses, cattle, sheep, and goats, are among those that have been introduced from other continents. The only animals domesticated from the wild in South America are the llama

and alpaca, relatives of the camel.

Mineral Resources. Rich deposits of gold and silver in South America were exploited by native Indians centuries before the arrival of Europeans, who were attracted to this land largely because of its mineral wealth. Bolivia the Potosí silver mines produced over \$1,500,000,000 from the time of their discovery until the first decade of the twentieth century. The gold deposits of Brazil at the height of their productiveness had an annual yield of over \$6,000,000. Colombia, Venezuela, and the Guiana colonies also have considerable deposits of gold and silver

Precious metals are still produced from occasional mines in the Andes, the Guiana Highlands, and the Brazilian Highlands, but in modern times other mineral resources have become more attractive for exploitation. These include industrial metals, such as copper, tin, platinum, and iron ore in the Andes; chemical resources, such as nitrate and guano, in the Pacific coastal desert; and petroleum in the coastal lowlands of Venezuela, Peru and

Argentina.

Discovery, Exploration and Settlement

During his third voyage of exploration, in 1498, Christopher Columbus explored the island of Trinidad and first touched the mainland at the mouth of the Orinoco. During his fourth voyage, from 1502 to 1504, he coasted along the continent from the peninsula of Yucatan

in Mexico to Venezuela. The next navigator to explore South America was Alonzo de Ojeda, a Spaniard, who followed the coast from near the equator to Venezuela in 1499. He was accompanied by Americus Vespucius, who published the first account of the New World, and whose name was given to the two continents. In the early months of 1500, Pinzón sailed along the eastern coast into the mouth of the Amazon, and then continued south until he had reached 8° 20' south latitude. He was followed shortly by Cabral, who made claims to large areas in the name of Portugal. Vespucius, also in behalf of Portugal, continued



SOUTH AMERICAN TROPICAL GRASSLAND A typical view in the llanos of the Orinoco, a lowland plain in the northern part of the continent.

the explorations south as far as the Plata River, and all were more interested in overcoming this huge land obstacle, which blocked a direct route to India, than in the character and resources of this new continent, with all its unknown wealth. After Balboa, in 1513, had crossed the Isthmus of Panama and discovered the Pacific Ocean, Magellan in 1521 rounded Cape Horn and found a water route to the East.

The interior of this vast continent began to interest the explorers after some of the essentials of the coastline were known. Francisco de Pizarro conquered Peru in 1531- 534, and his companion, Diego de Almagro, advanced farther south into Chile. Francisco de Orellana crossed the Andes and, following the course of the Amazon from its headwaters to its mouth, reached the Atlantic Ocean in 1541. While the Spaniards were exploring the continent from west to east, the Portuguese began in 1531 to push into the interior from east to west. They eventually occupied the vast region of Brazil. Spain and Portugal had almost entire control of the continent until the beginning of

OUTLINE AND QUESTIONS ON SOUTH AMERICA

Outline

I. Position and Size

- (1) Latitude and longitude (see map)
- (2) Relation to other continents
- (3) Greatest length, 4,800 miles
- (4) Greatest breadth, 3,300 miles
- (5) Area, 7,700,000 square miles
- (6) Comparative area

II. Shape and Coast Line

- (1) Roughly triangular—like North America
- (2) Regular coast line—like Africa
- (3) Few islands
- (4) Coast waters

III. Physical Features

- (1) Resemblance of surface features to those of North America
- (2) Andes
- (3) Eastern coastal lowlands
- (4) Eastern lowland plains
- (5) Eastern highlands
- (6) Rivers
 - (a) Amazon greatest in world
- (7) Lakes
- (8) Climate

IV. Vegetable and Animal Life

- (1) Characteristic vegetation
 - (a) Tropical forests
 - (b) Economically valuable forms
- (2) Animals
 - (a) Absence of powerful wild animals
 - (b) Forms peculiar to this continent

V. Minerals

- (1) Silver and gold
- (2) Other metals
- (3) Nitrate
- (4) Petroleum

VI. The Inhabitants

- (1) Native races
- (2) European immigration
- (3) African Negroes
- (4) Mestizos

VII. History

- (1) Discovery and conquest
- (2) Independence secured
- (3) Revolutions
- (4) Recent progress

Ouestions

Why is South America one of the first continents which the child in school is asked to draw?

What is the loftiest mountain peak on the continent? How does it compare with the loftiest of North America?

Why has South America a more equable climate than North America? What white man first touched the mainland of the continent, and where?

How does the largest lake in South America compare in size with the smallest of the Great Lakes?

What mineral substance does one of the western desert regions produce, and for what is it used?

How does it happen that there is little or no color prejudice in South America? What is the largest river system in the world? How long is the main river? Name four common domestic animals which are not native to this continent.

Is South America farther from the South Pole or nearer to it than Australia? How much?

Name two South American trees which yield important drugs. For what are they used?

How many of the continents are larger than South America? How many have a larger population?

What is the general character of the governments in South America?

What European countries long dominated this continent, and how is their influence still felt?

the nineteenth century. The Spanish colonies declared their independence, beginning in 1810, and established several republics after the model of the United States. After a protracted struggle, Spain formally recognized their independence in 1826. In 1823 Brazil became independent of Portugal and retained a monarchical form of government which lasted until 1889, when a republic was established.

For the greater part of the nineteenth century, these countries were disturbed by periodical internal revolutions, and their progress was in consequence slow. Since the beginning of the twentieth century, more stable political conditions have prevailed, and a great economic development is taking place as the vast natural resources of the continent are being opened up. However, revolutions aimed to depose those in governmental authority are not of infrequent occurrence. The historical account of each country is given under its own title.

R.S.P.

Related Subjects. For additional information see the following articles. Almost all of the articles on the political divisions also contain lists. See also LATIN AMERICA.

Falkland Tierra del Fuego
Galapagos Trinidad

MOUNTAINS
Aconcagua Cotopaxi
Andes Chimborazo

FOLTRICAL DIVISIONS

Argentina Ecuador
Bolivia French Guiana
Brazil Paraguay
British Guiana Peru
Chile Uruguay
Colombia Venezuela

Dutch Guiana

Amazon Magdalena
Madeira Orinoco
Parana Paraguay
Pilcomayo Tapajos
Rio de la Plata Uruguay
São Francisco

UNCLASSIFIED
Inca Patagonia
Indians, American Selvas
Llanos Titicaca, Lake

SOUTH AMERICAN SWITZERLAND, a term applied to Bolivia (which see).

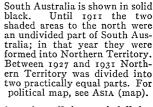
SOUTH ATLANTIC STATES. See UNITED STATES (Wealth in the Farms; Natural Resources); also pages 7383, 7384.

SOUTH AUSTRALIA, an agricultural state of the Commonwealth of Australia, occupying 380,070 square miles in the south central part of the continent and bordering on the Southern Ocean and the Great Australian Bight. It is a level or gently undulating plain, broken by several mountain ranges. The western plains are semi-arid and treeless, but the mountain slopes are heavily wooded with eucalyptus, sugar gum, and Indian cedar. The coast is deeply indented and penetrated by gulfs and bays. The largest of these are Spencer and

Saint Vincent's gulfs, separated by Yorke Peninsula. Eyria Peninsula lies between Spencer Gulf and the Great Australian Bight, on the west. The Gulf of Saint Vincent is

partly enclosed by Kangaroo Island, the longest island of Australia. There are few rivers, the only stream of importance being the Murray. The highlands are studded with shallow lakes which are numerous, but not permanent.





LOCATION MAP

in the highlands, there is sufficient rainfall for agricultural purposes, but in the interior the annual precipitation is only from five to eleven inches a year.

People and Education. The state population reported in 1940 was 598,091. The larger part of the inhabitants are of British or Australian birth; other Europeans include Germans and Scandinavians, and there are also several hundred Chinese.

There is no State Church, and the Church of England, though the largest denomination, has proportionally a smaller following than in any of the other Australian states. A number of other sects are represented, including Roman Catholics, Methodists, Lutherans, Baptists, Presbyterians, Congregationalists, Church of Christ, and Salvation Army. There are also Jewish temples and Mohammedan and Confucian shrines.

Education is secular, compulsory, and free to the age of fourteen, after which tuition is charged in secondary schools (since 1934). Much attention has been given to agricultural and technical training. Tree planting and nature study have been encouraged, and Arbor Day is an annual school holiday. There is an endowed university at Adelaide; also a state school of mines and industries.

Industries. Pastoral lands are leased by the government for the grazing of livestock. South Australia, however, is less devoted to pastoral pursuits than the other large states of the Commonwealth, and miles of arid grasslands are being converted into vineyards, orchards, and orange groves, with the introduction of irrigation, water for which is furnished by

artesian wells or by the Murray River. Vine culture, the propagation of citrus fruits, and the dried-fruit industry are important in these irrigated areas. Large crops of wheat, barley, oats, hay, and potatoes are raised in the south and east sections. Salt is obtained in great quantities from the shallow salt lakes. eastern mountain ranges contain extensive deposits of iron ore, gypsum, phosphate rock, copper, gold, silver, and other minerals; the first gold of Australia was mined in this state. Manufactures are few and unimportant.

Transportation and Commerce. South Australia has about 3,821 miles of railway, including 600 miles of the Transcontinental Railroad built to connect Brisbane, on the east coast of Queensland, with Fremantle, on the west coast of the continent. The Murray River, navigable for 2,000 miles, is a busy highway of transportation. Adelaide, the capital, is a great shipping center. The exports include fresh and dried fruits, wine, meats, butter,

wheat, flour, wool, and copper.

History and Government. Colonization in Australia was slow, and it was not until the first half of the nineteenth century that much progress was made. Matthew Flinders, the English navigator, made explorations and discoveries along the coast of the South Australian region in about 1802, and attracted some interest to this region in England. In 1830 another English explorer, Charles Stuart, sailed up the Murray River and made some important geographical discoveries and observations which came to the attention of Edward Gibbon Wakefield. The latter had a plan of colonization which he thought would result in the settling of new lands more readily than the old method of indiscriminately doling out large parcels of territory and forgetting about it. His idea was that persons who were willing to work and improve a new land should be allowed to own it. Others favored his scheme, and a certain George Angas was willing to advance funds for the project. In 1834 an act of Parliament sanctioned the plan, provided that it would involve no expense to the home government; another stipulation forbade the transportation of convicts.

Colonization began in 1836. During the first few years, over-expenditures for public buildings, speculation, and extravagance caused the colony to become insolvent. In 1841 the charter was revoked, and the settlement was made a crown colony. The discovery of valuable mineral deposits, and the excellent management of the new governor, Sir George Grey, again put the colony on a sound basis. In 1856 self-government was restored, and a constitution was framed which provided for a bicameral legislature. In 1901 South Australia joined the Commonwealth, to which, ten years later, it ceded Northern Territory. South

Australia is noted for its progressiveness in labor and social legislation, and the participation of the government in enterprises which are usually private undertakings.

The state governor, who is appointed by the king of England, is assisted by an executive council of six ministers and the chief justice of the supreme court. There is a parliament consisting of the legislative council and the house of assembly. The former consists of twenty members, elected for six years; the lower house is composed of thirty-nine members, elected for three years. There is universal suffrage, the vote having been extended to women in 1894. Electors voting for the members to the upper house must possess certain property qualifications. Justice is administered by the supreme, vice-admiralty, insolvency, circuit, and inferior courts.

Adelaide, the capital, is the third largest city in Australia. It was founded in 1836 and named after the queen of William IV of England. It is situated seven miles from the ocean, on the banks of the Torrens River, and is 508 miles northwest of Melbourne. The river, on the banks of which are beautiful parks, divides the city into North and South Adelaide, connected by handsome bridges. Famed as a residential city, Adelaide is one of the most beautiful in Australia, with broad, well-kept streets and many imposing buildings. Among these, the Houses of Parliament, the town hall, and the general postoffice are conspicuous. The city possesses a public library, a museum, a conservatory of music, and the University of Adelaide, founded in 1874. The climate, though excessively hot in the summer, is healthful. The city is governed by a mayor and six aldermen, and is the only Australian city in which the mayor is elected by the votes of all the taxpayers.

The principal industrial enterprises are plants for the manufacture of woolen, iron, and earthenware goods; tanneries, breweries, starch mills, and soap factories. An extensive trade is carried on with the interior and with foreign countries. Adelaide is the terminus of an extensive railroad system connecting it with Melbourne, Sydney, and Brisbane. The real commercial center is at Port Adelaide, on the coast, the port of call for all European steamers, and a flourishing town with about 29,000 inhabitants. The population of Adelaide, including suburbs, was 325,ooo in 1940, over one half the population of the state.

Related Subjects. The reader is referred in these volumes to the following articles:

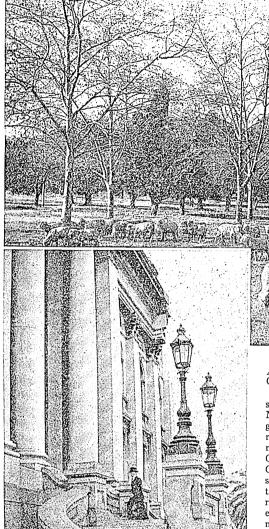
Australia British Empire, and British Commonwealth of Nations

Great Australian Bight Murray River Northern Territory

SOUTHAMPTON, ENGLAND. See Eng-LAND (The Cities).

SOUTH BEND, IND., an industrial city and county seat of Saint Joseph County. It is situated in the north-central part of the state, on the south bend of the Saint Joseph River, eighty-six miles southeast of Chicago. The city is an important commercial center, and is noted for the variety and extent of its manufactures. Population, 101,268 (Federal cen-

sus of 1940).



ADELAIDE, SOUTH AUSTRALIA

Above: Sheep grazing in an Adelaide park; St. Peter's
Cathedral is shown in the background. Left: The entrance to Parliament House.

small-fruit district of northern Indiana and southern Michigan, and is the center of a great peppermint-growing district. The Studebaker Corporation (automobiles and trucks), the Bendix Corporation (automobile and airplane brakes and accessories), and the Oliver Farm Equipment Company are located here. Other manufactured products include men's wear, sewing machines, lathes, modern wooden and reed toys, artificial baits and fishing rods, paints, steel ranges, home laundry machines, metal furniture, and elastic goods. South Bend's position in the precision metal working industry made it important in national defense production during World War II.

Institutions. The Northern Indiana Historical Society Museum is one of the finest in the state. Saint Mary's Academy for girls and the University of Notre Dame are located north of the city, having their own postoffice, designated as Notre Dame, Ind.

History. The site of South Bend was once occupied by a Miami Indian village, and later was the home of the Potawatomi tribe. The place was visited by French trappers and missionaries, and in 1824 a fort was established by Alexis Coquillard. The town was incorporated in 1835, and became a city in 1865. South Bend has a zoning law.

SOUTH BEVELAND, an island in the estuary of the Scheldt River forming a part of the Dutch province of Zeeland. See NETHERLANDS, THE (The Country).

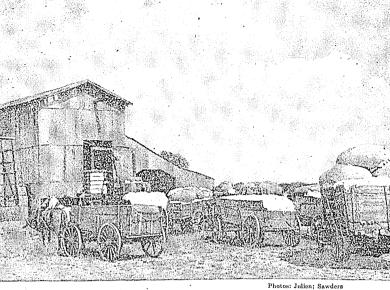
LANDS, THE (The Country).
SOUTHBRIDGE, MASS. See MASSACHU-SETTS (back of map).

South Bend occupies an area of 19.82 square miles, and takes its name from the sharp bend in the Saint Joseph River. Concrete roads radiate from South Bend, and U.S. 31, 20, and 112 South highways intersect in the heart of the city. The largest city park is Erskine, containing 120 acres. Others include Leeper, Potawatomi, Studebaker, Kaley, Howard, and Coquillard.

Transportation. Railroad lines entering the city are the Grand Trunk, the Michigan Central, the New York Central, the Pennsylvania, and the New Jersey, Indiana & Illinois (Wabash), as well as the Chicago, South Shore & South Bend Railroad, an electric line. South Bend is a terminus for important transcontinental bus and air lines.

Industries. South Bend, while primarily an industrial city, is surrounded by a fertile farming country, where dairying, grain-raising, gardening, and trucking are carried on extensively. It is the





SOUTH CAROLINA THE PALMETTO STATE

SOUTH CAROLINA, kar oh li' nah, is the southern section of the grant of land made to Sir Robert Heath by King Charles I of England, for whom the whole area was named. It is popularly called THE PALMETTO STATE, not solely because these trees grow in profusion along its coast, but also because of an heroic incident of the Revolutionary War. On June 28, 1776, in a half-finished fort of palmetto logs and sand, a handful of Americans commanded William Moultrie defended the harbor against the fire of eleven British men-of-war. The spongy palmetto logs held their place as the cannonballs sank harmlessly into the sand, while the Americans raked the enemy with their fire and forced the fleet to retire, winning

a brilliant victory.

From the high-forested hills of the Blue Ridge Mountains in the northwest to the palmetto groves and sand dunes of the barrier islands; from the marshes of the Savannah River, where the snowy heron and white egret nest and feed, to the formal gardens of the seaport city of Charleston, South Carolina is a land of rare beauty and charm. In spring, it is bright with the bloom of jasmine, azalea, magnolia, and camellia, and sweet with the songs of the cardinal and mockingbird. The state is rich, too, in tradition, historic incidents, and noted statesmen. Although it suffered the loss of its seaport Charleston, and a disastrous defeat at Camden late in the Revolutionary War, yet its leaders, John Rutledge, Francis Marion, Thomas Sumter, and Andrew Pickens, never lost heart. They turned the tide of the war at Cowpens and Kings Mountain, and thus hastened the British retreat to Yorktown where Cornwallis finally surrendered to Washington. South Carolina also proudly recalls its distinguished statesman, John C. Calhoun, who became the chief spokesman for the South and its principle of states' rights. It remembers, too, the opening fight of the War between the States at Fort Sumter, with all the brave, sad, victories and many defeats that came after it.

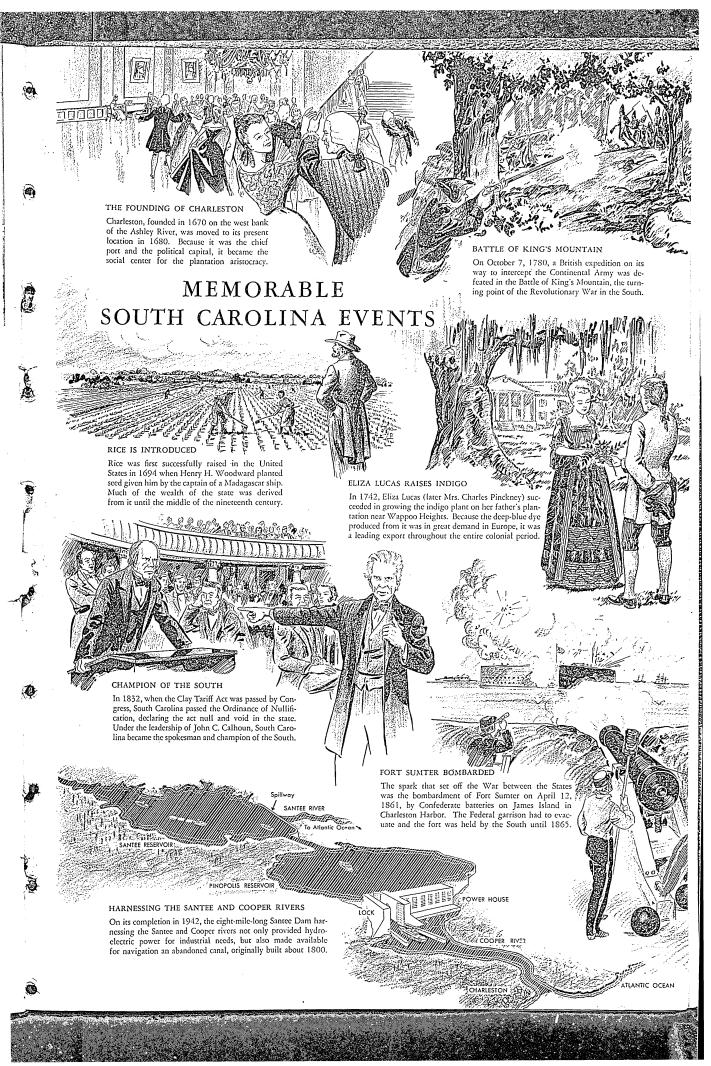
According to a traditional geography lesson, "Charleston is the place where the Ashley and Cooper rivers meet to form the Atlantic Ocean." For, in the early years, the town was a great seaport and trading center, drawing through itself all the crops of the upcountry as well as the rice and indigo of the tidewater region. Here, too, was the dominant political group and the social and cultural center of the Carolinas. As early as 1698, the first free library was opened in Charleston; one of the first operas was heard in 1735; and the first symphony and open-air concerts were given by the St. Cecilia Musical Society, organized in 1762. The first public museum was established here in 1773; a free school for whites by 1710; and free instruction for Negroes before 1750. At Charleston, in 1735, the earliest fire insurance company in the colonies was organized, and the first fireproof building in the United States was erected in 1826.

The South Carolina colonists experimented with many crops—oranges, tea, olives, and mulberry trees for silkworm culture. They were highly successful in their methods of growing rice and indigo, which became their staple plantation crops. The earliest sea-island cotton was grown on the barrier islands along the coasts of South Carolina and Georgia, and so got its name. The first bales to be exported, in 1791, were bought by Robert Owen, famous English millowner, who used its long, fine fibers to spin a thread of superlative quality. Sea-island cotton immediately became a standard of excellence in the markets of the world.

Today, the state competes with North Carolina for first place in the manufacture of cotton goods, with the largest cloth-bleaching works

in the South located at Rock Hill. At Georgetown is one of the largest wood-pulp mills in the world. South Carolina's kaolin (porcelain clay) is the purest to be found anywhere, and has

been exported since earliest times.



The state still pioneers: the Coker family of Hartesville with improved cotton; the farmers of tidewater and sand hills with varied crops of vegetables, fruits, and quick-growing pine; the millowners and laborers of the uplands with new educational and social programs. On the Saluda River and its other waterways, engineers are developing its vast water-power resources, conserving its fertile soils, and improving its transportation system. South Carolina's future is bright with promise.

The Land and Its Resources

Extent: Area, 31.055 square miles (161 square miles of which are inland water); thirty-ninth in size among the states. Greatest length, 215 miles; greatest width, 255 miles. Coast line, on miles

Greatest length, 215 miles; greatest width, 235 miles. Coast line, 200 miles.

Physical Features: Chief mountain range, Blue Ridge Mountains. Chief peaks, Sassafras Mountain (3,548 feet), Mount Pinnacle (3,218 feet), Caesar's Head (3,218 feet), Table Rock (3,157 feet). Elevation, highest, Sassafras Mountain, 3,548 feet, in Pickens County; lowest, sea level, along the Atlantic Coast. Chief rivers, Black, Edisto, Pee Dee (largest tributaries, Little Pee Dee, Waccamaw, Lynches), Santee (largest tributaries, Broad, Catawba, Congarce, Saluda, Wateree), Savannah. Chief lakes, Murray, Pinopolis, and Santee. Chief inlets and bays, Bulls' Bay, Charleston Harbor, Little River Inlet, Port Royal Sound, St. Helena Sound, Winyah Bay. Chief islands, Hilton Head, Isle of Palms, Parris, Port Royal, St. Helena.

Climate: Temperature, average annual, 63°; average

Royal, St. Helena. Climate: Temperature, average annual, 63°; average summer, 78.8°; average winter, 46.7°; lowest on record, -13° near Longcreek in Oconee County (Jan., 1940); highest on record, 111° at Blackville and at Calhoun Falls (Sep., 1925). Precipitation, average annual, 47.69 inches; average Apr. 1 to Sep. 30, 20.45 inches; average Oct. 1 to Mar. 31, 27.24 inches. Snowfall, average annual, 2.4 inches.

Location, Size, and Surface Features. South Carolina, one of the smaller states, roughly resembles a wedge driven inland from the coast. Beaufort, a seacoast city, lies in the same latitude as San Diego, Calif., on the Pacific. For the boundaries of South Carolina, see the colored map.

The state has three distinct natural regions: the Coastal Plain, the Piedmont Plateau, and

the Mountain Region.



The Coastal Plain, known locally as the low country, lay under the ocean in recent geologic ages; the old shore line is still traceable through Columbia and Camden. The present coast begins in the north as a smooth curving beach about sixty miles long; to the south it is broken by innumerable barrier islands, cut off from the mainland by sluggish creeks and salt marshes.

Fringing these are the fresh-water swamps, whose still, black waters reflect dense groves of palmettos, magnolias, live oaks, gum trees, and tall cypresses hung with Spanish moss. Here, alligators bask in the sun. In the north, extending into the region below the Cape Fear River in North Carolina, are the treeless sedge bogs or savannas, thick with reeds and flowers and many insect-eating plants. Of the latter, the rare and curious Venus's flytrap (which see) grows wild nowhere outside the Carolinas.

For fifteen to thirty miles inland the rivers of the tidal basin overflow their banks, especially in spring when tides are running high, and cover the bottom lands with a rich silt. Here, in the past, stretched the rice fields; today the rice, growing wild, attracts vast flocks of migrating birds. Above the flooded lands and swamps, and along the river banks, for fifty to one hundred miles inland are many thousands of acres of land suitable for agriculture. This is the region of the large cotton and tobacco plantations and the truck and fruit farms; here, too, are many Northwest of these fertile lumber mills. lands, and running across the state from northeast to southwest along the Fall Line (which see), are the pine barrens of the sand-hill country. Thinly covered with blackjack oaks and scrub pines, this once was considered the least productive region of the state. It now furnishes great quantities of scrub pine and oak for the paper and pulp mills; and in the sandy soil, where the land has been cleared, grapes, peaches, asparagus, and strawberries thrive.

The Piedmont Plateau rises abruptly from

the Coastal Plain at the Fall Line. Beginning as a level highland, it becomes more rolling and hilly until it reaches the foothills of the Blue Ridge Mountains. Its hills rise from eight hundred to one thousand feet above sea level. The plateau is dotted with small farms, ragged woodlands of cedar and pine, and many mill and factory towns. It is the richest and most

populous region of the state.

The Mountain Region occupies only about five hundred square miles. Except for such vertical headlands as Table Rock and Caesar's Head, the mountains are neither rugged nor steep. Few of them are more than three thousand feet high, and all are forest-crowned. Scattered through the region are many summer homes and vacation resorts. The Mountain Region and the Piedmont Plateau together are known as the upcountry.

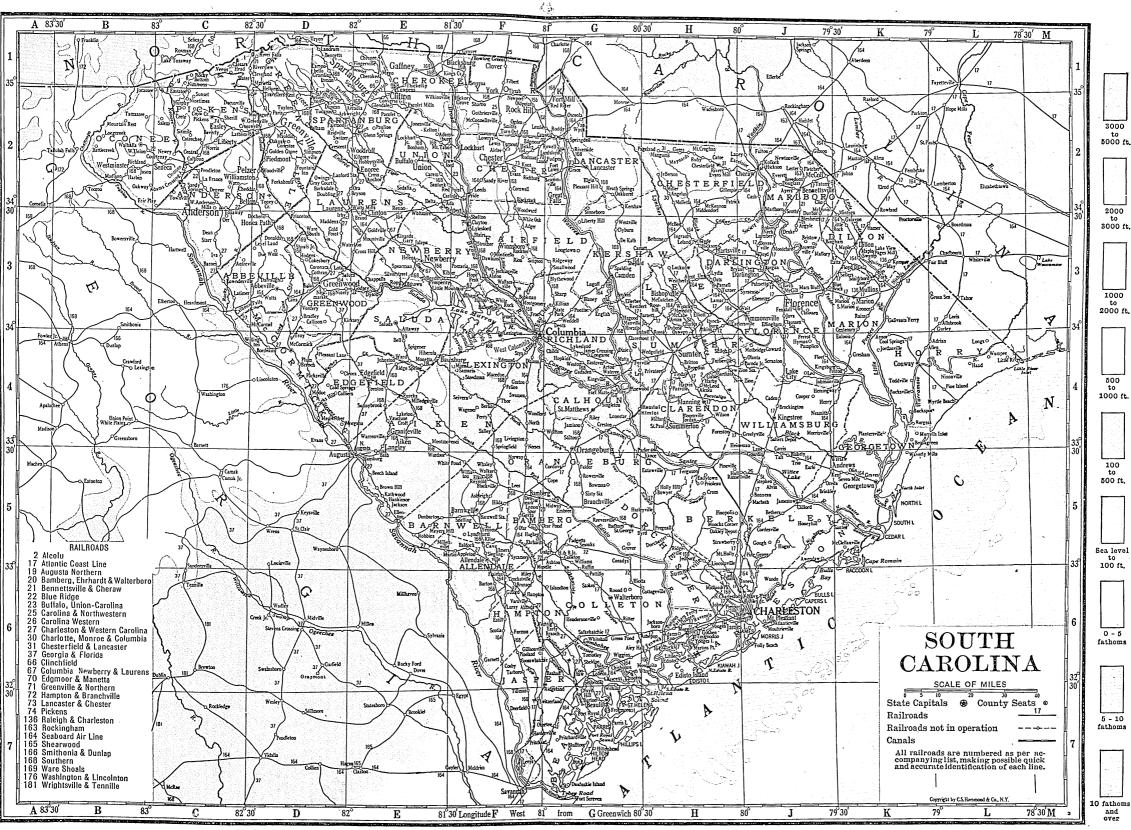
Pronunciation Guide

Aiken ay' ken Barbados bar bay' doz Beaufort boh' fert Baruch bah rook' Cheraw chee'roh Dreher dray' er Edisto ed' is toh

Gullah gul' ah Huguenot hu' gch not kaolin kay' oh lin Moultrie mohl' tree Oconee oh hoh' nee Saluda sah loo' dah Wateree wah ter ce'

SOUTH CAROLINA

Camson, (34) 175 Little River, (L4). 270	Abbeville, (D3)	Camden, (G3) 5,747 Cameron, (G4) 624 Campobello, (D1) 389 Carlisle, (F2) 303 Cartersville, (J3) 315 Cateschee, (C2) 600 Cayce, (F4) 1,476 Centenary, (K3) 100 Central, (C2) 1,496 Chapin, (F3) 311 Chappells, (E3) 195 Charleston, (J6) 71,275 Cheraw, (J2) 4,497 Cherokee Falls, (E1) 710 Chesnee, (E1) 827 Chester, (F2) 6,392 Chesterfield, (H2) 1,630 Clarks Hill, (D4) 160 Claussen, (J3) 109 Clearwater, (E4) 833 Clemson, (C2) 435 Clifton, (E2) 6,650 Clinton, (E3) 5,704 Clio, (J2) 821 Clover, (F1) 3,067 Colliers, (D4) 2,275 COLUMBIA, (G3) 62,396 Congaree, (G4) 160 Congaree, (G4) 160 Congaree, (G4) 160 Congaree, (G5) 125 Conway, (K4) 5,066 Coosawhatchie, (F6) 165 Cope, (G5) 128 Cordova, (G5) 139 Coronaca, (D3) 192 Cottageville, (H6) 544 Coward, (J3) 195 Cowpens, (E1) 1,343 Crescent, (D2) 54 Crocketville, (F6) 160 Cross Anchor, (E2) 217 Cross Hill, (E3) 525 Crosskeys, (E2) 131 Dale, (G6) 100	Estill, (F6)	Fountain Inn,(D2)1,346 Frogmore, (G7). 190 Furman, (F6). 380 Gable, (H4). 330 Gaffney, (E1). 7,636 Galivants Ferry, (K3). 103 Garnett, (F6). 190 Gaston, (F4). 175 Georgetown, (K5).5,559 Gifford, (F6). 142 Gilbert, (F4). 153 Gillisonville, (F6). 109 Givhans, (H5). 132 Glendale, (E2). 898 Glenn Springs, (E2) 134 Goldville, (E3). 222 Govan, (F5). 113 Gowensville, (D1). 107 Graniteville, (E4). 2,816 Gray Court, (D2). 401 Great Falls, (G2). 3,872 Greelyville, (J4). 633 Green Pond, (G6). 311 Green Sea, (L3). 55 Greenville, (D2). 34,734 Greenwood, (D3). 13,020 Greet, (D2). 2,940 Gresham, (K4). 100 Gurley, (L3). 106 Guthriesville, (F2). 102 Hagood, (G3). 230 Hamer, (K3). 335 Hampton, (F6). 997 Hand, (L4). 108 Hardeville, (H3). 5,399 Heath Springs, (G2). 570 Helena, (E3). 497 Hemingway, (J4). 536 Hickory Grove, (F2). 272 Hilda, (F5). 246 Hiltonhead, (G7). 107 Hodges, (D3). 303 Holly Hill, (H5). 1,062 Honea Path, (D3). 2,765 Hopkins, (G4). 110	Inman, (D1). 1,115 Irmo, (F3). 2,30 Islandton, (G6). 159 Iva, (C3) 1,285 Jackson, (E5). 165 Jamestown, (J5). 135 Jamison, (G4). 128 Jackson, (G4). 128 Jedburg, (H5). 130 Jefferson, (H2). 547 Jenkinsville, (F3). 108 Johns Island, (H6). 1,125 Johnsonville, (K4). 464 Johnston, (E4). 1,100 Jonesville, (E2). 1,182 Jordan, (H4). 270 Jordanville, (K4). 31 Kathwood, (E5). 192 Kershaw, (G2). 1,264 Killian, (G3). 167 Kinards, (E3). 234 Kingsburg, (J4). 188 Kings Creek, (F1). 110 Kingstree, (J4). 3,182 Kingsville, (G4). 100 Kirksey, (E3). 82 Kingsville, (G4). 100 Kirksey, (E3). 82 Kingsville, (G4). 100 Kirksey, (E3). 82 La France, (C2). 160 Lake City, (J4). 2,522 Lake View, (K3). 532 Lamar, (H3). 921 Lancaster, (G2). 4,430 Lando, (F2). 165 Landrum, (D1). 1,289 Lanc, (J4). 297 Lanford Station, (D2). 110 Langley, (E4). 1,705 Latta, (K3). 1,334 Laurens, (D2). 6,894 Leeds, (F2). 160 Leesville, (F4). 1,217 Lena, (F6). 188 Leo, (J4). 193 Liberty, (C2). 2,240 Liberty Hill, (G3). 174 Lincolnville, (H5). 261 Little Mountain, (E3). 251
	Callison, (D3) 164	Dalzell, (G4) 190	Fort Motte, (G4). 500	Hyman, (J4) 175	Little River, (L4). 270



SOUTH CAROLINA (Continued)

		JIII (0	oniting aca,	
Little Rock, (K3). 217 Livingston, (F4). 178 Lockhart, (F2). 2,244 Longes, (G5). 242 Lonestar, (G4). 135 Long Creek, (B2). 10 Loris, (L3). 1,238 Lowndesville, (C3) 201 Lowrys, (F2). 315 Lucknow, (H3). 153 Lugoff, (G3). 360 Luray, (F6). 162 Lydia, (H3). 294 Lyman, (D2). 1,989 Lyman, (D2). 1,989 Lyman, (D2). 1,989 Lymchburg, (H3). 382 McCellanville, (K5). 431 McColl, (J2). 2,391 McConnellsville, (F2). 263 McCormick, (D4). 1,456 Macbeth, (J5). 104 Maddens, (D3). 160 Madison, (B2). 293 Manning, (H4). 2,381 Marietta, (D1). 360 Marion, (K3). 5,746 Mars Bluff, (J3). 325 Martin, (F5). 162 Muddin, (D2). 220 Mayesville, (H4). 712 Mayo, (E1). 100 Meggett, (H6). 1,155 Meriwether, (D4). 27 Meyers Mill, (E5). 165 Mondes, (D4). 152 Moncks Corner, (H5). 1,165 Moncks Corner, (H5). 1,165 Monticello, (F3). 134 Montimelello, (F3). 134 Montimelelo, (F3). 134 Montimerenci, (E4). 263 Moore, (E2). 155	Mount Croghan, (H2)	Pelzer, (C2)	Sardinia, (H4)	Una, (D1)
Montmorenci, (E4) 263	(K5) 137	Salley, (F4) 443	Trio, (J5) 164	Woodward, (F2) 216
				Yemassee, (G6) 684
Moultrieville, (J6). 566	Peak, (F3) 147	Saluda, (E3)1,516	<u>Tucapau</u> , (D2) 891	Yonges Island, (H6) 297
Mount Carmel,	Pelham, (D2) 329	Samaria, (F4) 109	Turbeville, (H4) 234	York, (F1)3,495
(D3) 114	Pelion, (F4) 212	Santuck, (E2) 110	Ulmers, (F5) 169	Zion, (K3) 216

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Rivers and Lakes. Three main river systems drain the state: the Pee Dee, the Santee, and the Savannah. All have their headwaters in the Blue Ridge Mountains across the border in North Carolina; and all flow into the Atlantic Ocean. Across the whole Piedmont Plateau. but especially at the Fall Line, the rivers develop tremendous hydroelectric power. The tides rise for fifteen to thirty miles upstream. All the rivers are navigable from the ocean to the Fall Line, many of them for more than one hundred miles. No large natural lakes are found in the state, but power dams have been built on several rivers, creating artificial lakes. The largest of these are Lake Murray and Lake Greenwood, and the Pinopolis and Santee reservoirs.

Climate. South Carolina has a subtropical climate along its coast, and is almost tropical in the southernmost part. Its swamplands are malarial and generally unhealthful. The beach and island resorts have cool night breezes in summer, and the upland and mountain regions have temperate weather throughout the year. In the mountains, the temperature sometimes drops below zero and snow stays for several days; but elsewhere the state has little freezing weather and almost no snow. The rainfall, heaviest in summer; is evenly distributed. The prevailing winds in summer are from the south and southwest. In the winter, the western section has winds from the west and southwest; and from the north in the east. The coast is occasionally swept by severe hurricanes originating in the West Indies, and the western region by destructive tornadoes. Charleston was devastated by an earthquake in 1886.

Natural Resources. The greatest natural wealth of South Carolina is its water power. Since the beginning of the twentieth century, the development of hydroelectric plants has been far in advance of local needs, and has furthered great industrial expansion. Fertile soils help make possible the harvesting of three crops a year of many berries and vege-tables, and two crops of grains. There are large reserves of timber, not only in the swamplands and wooded mountains, but also in woodlots scattered throughout the state. The commercially valuable mineral deposits include pottery clays, phosphates, building stone, and small veins of gold and tin.

Wild life is abundant in the dense thickets and groves along the coast and in the uplands. Virginia deer are more plentiful here than in any other state, and bear, opossum, raccoon, and red and gray foxes also abound. Here, too, is the home of the handsome and rare blackpelted fox squirrel. The snowy heron and the white egret still inhabit the cypress swamps. Among the game birds are migrant flocks of wild duck, wild geese, woodcock, snipe, and wild turkey. About one hundred and sixty spe-

cles of salt-water fish are found off the coast. Five areas, comprising 200,000 acres, have been set aside for state and Federal conservation projects. The largest are on the South Tiger River in Spartanburg and Greenville counties, and on Fishing Creek in Chester and York counties. Here tree planting, strip cropping, and crop rotation methods are taught to the farmers.

The South Carolina Commission of Forestry, created in 1927, protects and replants the wood-lands. In addition to the Federal fish hatcher-ies at Orangeburg and Walhalla, the state maintains eight hatcheries. Bird refuges and sanctuaries are maintained by the National Association of Audubon Societies, the Charleston Museum, and the Federal Government.

The People and Their Work

The People and Their Work

Population: 1.859.804 (1940), ranking twenty-sixth among the states. Density, 60.1 per square mile, ranking eighteenth. Distribution, urban, 24.5 per cent; rural, 75.5 per cent. Largest cities, Charleston (71,275). Columbia (62,366), Greenville (34,734). Spartanburg (32,249). For population of other cities, see back of colored map. Peris, Charleston, Georgetown. Chief Products: Agricultural. cotton, tobacco, dairy products, corn. hogs, iruit, vegetables, pigeons and poultry, eggs, oats. wheat, peanuts, rice, potatoes, shrubs and flowering plants. Mineral, granite, kaolin, phosphates. Lumber, cedar, Cypress, gum, oak, pine, poplar. Fisheries, shrimp, oyster, crab. Manufadural, cotton and rayon textiles and yarns, dyed goods, furniture and lumber products, wood pulp, paper, non-alcoholic beverages, fertilizers, newspapers, chemicals, canned foods, ships.

The People. Since the Revolutionary War, little change has occurred in the population pattern of South Carolina. Most of the inhabitants are native-born, and many are descendants of the early English settlers. Traces of French and Spanish influence, dating from the earliest attempts to colonize the area, are still found along the southern coast. Of the Indian tribes, a few scattered remnants are all that are left, chiefly in a tiny reservation for Catawba Indians in York County.

The first successful colonists, Englishmen from the mother country and from Barbados, settled around the present site of Charleston. They established the plantation system, which depended upon large numbers of slaves, and piled up wealth through exports of indigo and rice. The liberal religious and political policies of the colony brought many Dissenters from England and Huguenots from France.

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Later, the lands between the tidewater and the Fai Line were settled by German Swiss, Germans from the Rhine Valley, Scotch-Irish, and by persons from neighboring colonies. Between 1745 and 1760, the upcountry was settled by immigrants from the Rhine, from the colonies to the north, and from Ulster. The close of the Indian Wars in 1761 brought large numbers of Scotch-Irish. These became industrious small farmers, few of whom owned slaves. By 1776, there were 60,000 white persons in South Carolina, of whom nearly one half lived in the upcountry. On the plantations of the low country were more than So,000 Negroes, a ratio

of nearly three colored persons to one white. Except for a brief period in the early nineteenth century, the blacks continued to outnumber the whites in the state until 1930, when a trend toward an increasing proportion of whites began. One of the most interesting Negro groups is the Gullah, living around Beaufort, whose peculiarly soft dialect has influenced the speech of both white and black in the tidewater region.

After the Revolutionary War, the only large groups of newcomers to South Carolina were the Irish, following the potato famine of 1845-1847, and the North Germans, who came after the political upheaval of 1848 in their homeland. Today, the percentage of foreign-born is only 0.3, one of the lowest among the states, with Greeks and Germans leading in numbers. The whites comprise 57.1 per cent of the population,

and the Negroes, 42.9 per cent.

Agriculture. Since the first English settlers brought casks filled with roots, slips, and seeds ready for planting in the fertile soil of the new colony, agriculture has been the leading occupation. The first rice to be grown successfully on the North American continent was planted in the South Carolina swamps in 1680 by Henry H. Woodward. This Madagascar rice, an especially large and fine variety, found its ideal home in the tidewater country along the coast. Until 1860 the state produced from one half to two thirds of the rice grown in the United States. Indigo, from which beautiful blue and purple dyes are made, was introduced in 1742 by Elizabeth Lucas (see Women, GREAT AMERICAN). It was shipped by the millions of pounds to the dye vats of Europe. Rice and indigo were the chief sources of wealth in colonial days. The loss of the indigo market to the East Indies during the Revolutionary War, coupled with the invention of chemical dyes, caused indigo to decline in importance. After the War between the States, it was found that rice could be grown more cheaply in other states. Today, in South Carolina, these two crops are raised only for local use.

Cotton. Although some cotton was grown in colonial times, it did not become an important export until the introduction of the long-staple sea-island variety, shortly after the Revolutionary War. The invention of the cotton gin in 1792 stimulated the growing of short-staple cotton in the interior, and South Carolina became one of the leading cotton producers. After the War between the States, lower cotton prices caused by overproduction made it difficult for plantation owners to pay wages to the great numbers of farm hands needed for growing and picking the crop. As a result, many

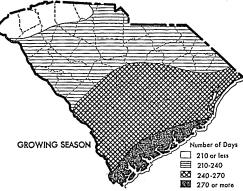
large plantations were broken up.

Today, the increased production of cotton in other regions and the reduced price in the world market have turned the planters' attention to diversified farming. Cotton is still the

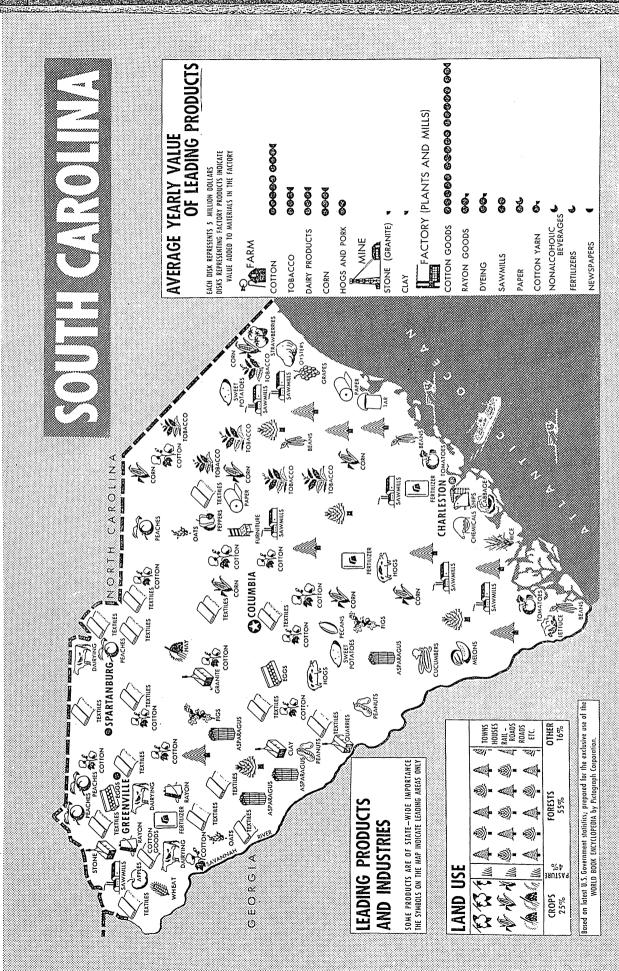
leading crop, however, giving South Carolina seventh rank among the states in its production. It is grown in almost every county. The Coker family of Hartsville have produced a diseaseand wilt-resistant cotton plant, now widely grown throughout the southern United States.

Tobacco, especially bright-leaf, flourishes in the Pee Dee Valley, and ranks second only to cotton in cash value. It was in Florence County, about 1886, that Frank M. Rogers experimented with stripping and curing tobacco leaves as they ripened, until the entire plant was harvested. Such superior tobacco was produced by this method that it has been adopted throughout the bright-leaf tobacco regions. Around Estill is another important tobaccoproducing region where record-breaking crops have exceeded 1,000 pounds an acre. Mullins is the tobacco-marketing center of the state. other large markets being located at Florence and Timmonsville.

Fruits, Vegetables, and Other Small Crops. In the production of early cabbage, shipped from Meggett in Charleston County, South Carolina holds first rank among the states. It



is surpassed only by Louisiana in the production of peppers, shipped from Florence. In the growing of asparagus, centered in the sandhill region, South Carolina ranks second only to California. It is also a leading producer of tomatoes and of Irish and sweet potatoes. Peas, snapbeans, lettuce, watermelons, and cantaloupes are important crops. In Bamberg, melons are waxed to be exported to Europe. The largest strawberry market is at Loris, in Horry County. Pecans, grown in many sections, are especially important in Calhoun and Orangeburg counties. Peaches are shipped from Greenville, York, Spartan, Chester, and Laurens counties. Production of peanuts, centered in the Savannah River area, has increased 300 per cent since 1930, because of the discovery of new industrial uses for this product. Pansy seed is grown at Fountain Inn in Greenville County, and paprika in Florence and Dillon Florence County also ships large quantities of shrubs and flowering plants.



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Corn, grown since early colonial days, is produced in all sections. Ground into meal, it is a staple food of the people. Soybeans and hay are other important crops. Sorghum cane is grown on the upper Piedmont and in the mountains.

Livestock. Damage to the cotton crop by the boll weevil turned the attention of many farmers to poultry farming and the building up of herds of pure-bred cattle and hogs. region between Sumter and Columbia leads the state in production of cattle and hogs. Many hogs are raised in the mountains, but principally for home consumption. Along the northern boundary, around Chester and at Pendleton and Rock Hill, are many excellent dairy herds. One of the most successful specialized ventures is the pigeon farm at Sumter, the largest in the world, which annually ships 100,000 squab to all parts of the country. Turkeys are grown in several sections of the state. Race horses trained near Columbia are world-famous; among them is Seabiscuit, one of the greatest money-makers of all time.

Manufactures. Because its inhabitants were primarily agriculturalists, and because of the political views of its farmer-politicians, South Carolina was slow in developing its manufactures, despite the vast potential supply of water power in its swift rivers. During colonial times and the early national period, a few mills for manufacturing grist, lumber, and textiles, usually run by slave labor, were established. The first successful cotton mill (about 1840), still in operation, was owned and managed by William Gregg in Aiken County. Only seventeen cotton mills were operating at the opening of the War between the States, and during Reconstruction days, most of these were closed. In 1876, however, a cotton mill having 10,000 spindles was built at Piedmont, and the era of modern industry began.

About 1895, electric power began to replace direct water power. A cotton-duck mill at Columbia was probably the first textile mill in the world entirely equipped for electric power. Today, with more than 5,000,000 spindles and 125,000 looms, South Carolina vies with North Carolina for top rank in the manufacturing of cotton goods. In the state, too, are many rayon mills. South Carolina's textile industry produces more income than all its farms. Among the thriving textile communities are Spartanburg, Columbia, Greenwood, Greenville, Rock Hill, Aiken, Anderson, and Belton.

Second in importance only to cotton textile production is the cottonseed crushing industry centered at Anderson, Camden, Marion, Columbia, Ninety Six, and Greenwood. The process of extracting cottonseed oil was first developed in America at Columbia in 1826.

Every section of the state has lumber mills. In the coastal swamps cheap pine lumber, and crates and boxes for packing truck crops, are made by "woodpecker mills" which stay in one place only long enough to cut all the usable lumber, and then move on. There also are many permanent mills, which cut less recklessly and have good conservation control. Lumber, wood veneers, and furniture are among their products. Sumter, Aiken, Camden, and Charleston are great lumber-shipping points. Besides sawmills, there are large paper mills which use immense quantities of wood pulp from the slash pine and scrub oak forests. Turpentine. pitch, and tar are produced from the longleaf pines growing around Ellenton on the Savannah River, and at Patrick near Cheraw.

At Charleston are the largest cigar factories in the state. Bricks and tile are made near Marion, Greenville, and Sumter, and glass is manufactured at Laurens. Canning is a growing industry. Beaufort is noted for its shrimp, oyster, and fish canneries; and many vegetable and fruit canneries have been established to use the surplus crops of Marlboro, Charleston, Beaufort, and other coastal counties. In the western end of the state, Spartanburg is the

canning center.

At Greenville are many large gristmills, and feed and flour mills. Truck and bus bodies are constructed at Rock Hill, plows at Florence, and chemicals at Greenville.

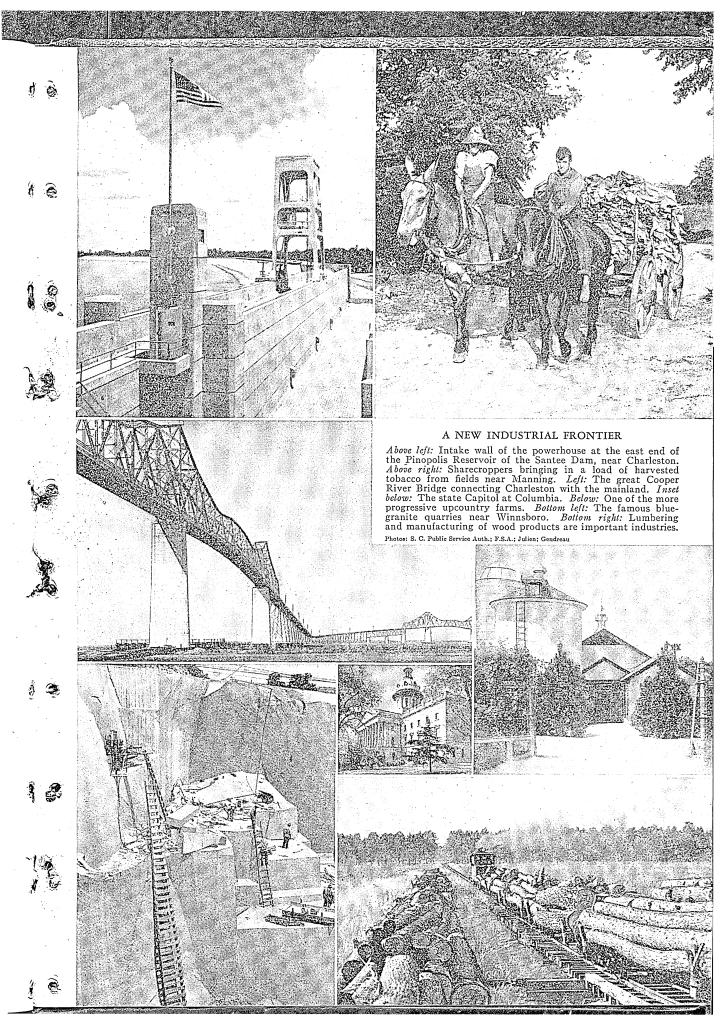
Power to run the mills and factories is generated by many hydroelectric projects on the rivers of the Piedmont Plateau and along the Fall Line. South Carolina ranks fourth among the states in potential hydroelectric power, and is a leader in the development of this resource. The Dreher Shoals Dam, built in 1930 to generate power on the Saluda River, is the largest earthen dam of its kind in the world.

The numerous bays and salt-Fisheries. water creeks of the coast contain extensive oyster beds, and oysters are the most important sea product of the state. Those harvested at Bulls Bay are especially famous. The most important fishing center is Murrells Inlet where shrimp, oysters, crabs, clams, mussels, flounder, shad, and salt mullet are canned or prepared for shipment. Other fishery centers are Beaufort, Port Royal, and Charleston. Terrapin, a kind of turtle, is an important product of the fish-packing plants along the coast. Pike, perch, and trout are caught in freshwater streams on the upper Piedmont.

Minerals. In colonial times "porcelain earth" was shipped to England from pits near Camden, and was used and praised by the famous potter, Josiah Wedgwood (which see). The purest kaolin (porcelain clay) in the world is found between Aiken and the Savannah River, and the state ranks second only to North Carolina in its production. South Carolina clays are used as fillers in the making of cotton goods and

fine book papers.





The famous blue granite, widely used for monuments, is quarried near Winnsboro, and eighteen other counties have granite quarries. Near Columbia, in Richland County, are several stone and glass-sand pits; Kingstree has a large sand refinery. Tin is mined in small quantities at Smyrna, from one of the few deposits in the United States; gold is also found here. The Haile gold mine near Lancaster, one of the largest in the Appalachian Mountains, has operated periodically since 1828. A new method of mining, put into use in 1934, greatly stimulated gold production. Phosphate rock, once the principal mineral wealth of the state, is of decreasing importance. The rock is still crushed, refined, and shipped in commercial quantities from Beaufort, and is used in fertilizer factories at Charleston, Columbia, and Greenville.

Transportation. Canoes and Indian trails were the first means of transportation in South Carolina. As the colony grew, the footpaths became rude wagon tracks, but for many years much of the traveling was done by water. Rivers still are used for the hauling of freight. Many canals were built between Revolutionary times and the laying of the first railroads, and in recent years these have been widened and deepened, especially in the Santee-Cooper basin connecting Charleston with Columbia. Today, the Intracoastal Waterway, which extends from Boston to Florida, runs between the barrier islands and the mainland, and protects small shipping from storms. Good harbors are found at Charleston and Port Royal. The latter has the deepest natural harbor south of Chesapeake Bay, although it has never become important commercially.

In 1827, the first railroad was chartered to run between Charleston and Hamburg. Five other lines were built before 1860, but a large part of the tracks and rolling stock were destroyed during the War between the States. By 1880, three large lines had taken over the ravaged road beds and reconstructed the railroads. Today, the state has more than 3,600 miles of railroads. Columbia and Spartanburg are important railroad centers, and Florence has huge shops for maintaining rail equipment; it also is the point where shipments of fruit, vegetables, and fish are re-iced and sent on to northern markets.

Since the organization of the State Highway Department in 1917, all parts of the state have been connected by more than 6,500 miles of hard-surfaced roads. Notable engineering feats have been accomplished in building roads across swamps and sandbeds.

The state has more than thirty airports, as well as large naval fields and seaplane bases at Charleston Navy Yard and a Marine Corps Airfield on Parris Island near Beaufort. The army maintains several important flying fields in the state.

Press and Radio. The first newspaper in the colony, the South Carolina Weekly Journal, was founded in Charleston in 1730, but lived for only six months. The South Carolina Gazette. begun at Charleston the following year, was continuously published until 1792. Its successor was the *Courier*, first published in 1803, which became the News and Courier, Charleston's chief morning newspaper. During the years before the War between the States, the Charleston Mercury upheld the flaming torch of states' rights and engaged in fiery discussions of the abolition of slavery. The Mercury and the Courier, with the Southern Review, the Southern Quarterly Review, and Russell's Magazine, deeply influenced the political and economic attitudes of the South.

There are more than ninety newspapers and about thirty periodicals published in the state. Besides the Charleston News and Courier, the largest newspapers include the State and the Record of Columbia; the News and the Piedmont of Greenville; and the Spartanburg Herald-Journal.

The first radio station was WFPA, founded at Spartanburg in 1929. Other important stations are WIS, Columbia; WFBC, Greenville; and WCSC and WTMA at Charleston.

Social and Cultural Achievements

Educational Institutions: Colleges, Seminaries, and Universities, Clemson Agricultural (state-supported), Coker, Columbia, Columbia Bible, Erskine, Lander, Limestone, Newberry, Presbyterian, Winthrop (for women, state-supported), and Wofford colleges; the College of Charleston; Medical College of the State of South Carolina (state-supported); Th (citadel (military, state-supported); Lutheran Theological Southern Seminary; Furman University; and the University of South Carolina. Negro Colleges and Universities, Avery Institute, Benedict, Calflin, Clinton Normal and Industrial, and Morris colleges; State Colored Normal, Industrial, Agricultural and Mechanical College of South Carolina (state-supported); Allen University.

Mechanical College of South Carolina (state-supported), Amen University.

State Welfare, Correctional, and Penal Institutions: Children (correctional), the South Carolina School (boys), at Florence; the John G. Richards School (Negro boys), at Columbia; (dependent boys and girls) John De La Howe School, at McCormick. Physically handicapped, Institution for the Deaf, Dumb, and Blind, at Cedar Springs. Mentally handicapped, State Training School at Clinton, for mental defectives; State Hospital (white and Negro), at Columbia, for the insane. Penal institutions (whites and Negroes), state penitentiaries for men, and for women, at Columbia.

Education. South Carolina early became known as one of the most literate of the colonies, for its schools were open to all. Here, in 1694, were founded some of the earliest free schools. A Free School Act in 1710 provided for the use of legacies designed to provide for education. The great increase in the Negro population and the settlement of isolated communities in the upcountry created an educational problem that has persisted to the present day: maintaining schools for both whites and Negroes not only in the cities but also among a scattered rural population.

In 1868 the present school system was established, but it was not until 1878 that separate schools were established for whites and Negroes. High schools became a part of the



public-school system in 1907. Public education is administered by the state board of education, assisted by county boards and local district officials. Because poverty made it difficult for many of the people to obtain schooling, illiteracy spread until South Carolina had the highest rate in the Union. To combat this problem, the legislature, in 1918, created a division for adult instruction, inspired by the notable success of pioneer adult education work among the mill workers of Spartanburg, begun in 1913. School attendance was made compulsory in 1922. Since then illiteracy has sharply de-The Parker District School, near Greenville, is noted among educators throughout the nation for its experiments in vocational instruction for mill children. Extension work among the Negroes is done by the State Normal, Industrial, Agricultural, and Mechanical College of South Carolina, at Orangeburg, which was opened in 1896 as a coeducational school for Negroes.

Among the leading colleges and universities

The Citadel, at Charleston. Founded in 1842 by the state for military instruction prescribed by the War Department. Upon graduation, cadets are eligible to the Officers' Reserve Corps of the United States Army

Clemson Agricultural College, at Clemson. Chartered in 1889 on the old homestead of John C. Calhoun. Courses include agricultural economics, engineering,

Courses include agricultural economics, engineering, architecture, general science, textiles, chemistry, geology, vocational education, and military science. Medical College of the State of South Carolina, at Charleston. Opened in 1824, it is one of the oldest in the South. Its pathological museum is widely known. Coeducational and state-supported. Courses in medicine, nursing, and pharmacy.

University of South Carolina, at Columbia. Chartered in 1801, it was opened as the College of South Carolina; coeducational since 1894; state supported. During the War between the States, its halls were used, first by the Confederates, then by the Union army, as a hospital. Colleges and schools include those of arts and sciences, education, commerce, those of arts and sciences, education, commerce, journalism, law, engineering, pharmacy, and graduate

Winthrop College, at Rock Hill. Founded in 1886 as a school for women; state-supported since 1891. Liberal arts, normal, and industrial courses. Supervises demonstration work in home economics.

Libraries. South Carolina has been called the mother of free public libraries of America, because at Charleston, in 1698, the first such institution was established. In 1700 (simultaneously with New York), the provincial assembly created a library commission. The first tax-supported library in South Carolina was the Marion Public Library. In 1748, the "Charles Town Library Society," which still functions, began one of the most valuable newspaper files in the nation. Funds were granted the College of South Carolina (now the University) in 1802 to start a library, and in 1840 it erected the first college library building in the United States.

In 1903 an act was passed permitting towns

and cities to subscribe to the maintenance of a free public library within their limits. In 1915 a State Library Association was organized. and in 1929 the State Library Commission was created to support and develop the library facilities of the state. The state has forty library systems, and some rural areas have access to library service through bookmobiles and mail

Arts and Crafts. The most interesting art of colonial times in South Carolina was the adornment of the houses by local artisans, both Negro and white. Typical of Charleston, but also scattered along the tidewater rivers, are homes with delicately wrought iron grilles at windows, doors, and garden gates, and intricate interior wood carving and plaster scrollwork. The early architects adapted the Georgian (English) architecture to the hot climate of the region by constructing thick walls of brick, high basements, deep porches, and shaded balconies on the windward sides of the houses. Robert Mills, who designed the Washington Monument in Washington, D. C., built many of the finest homes and public buildings in the state. On the plantations were built many tiny churches, called "chapels of ease." Formal gardens, laid out for wealthy planters by garden architects from England, have taken on a local quality because of the black waters of swamp and creek, the moss-hung cypresses and live oaks, and the native flowers that adorn them.

Painting — especially of portraits — passed through a brilliant period in Charleston during the years between the Revolution and the War between the States, when wealthy planters patronized the arts. Two miniature painters of that period, Edward Green Malbone and Charles Fraser, rank with the best in America. John Blake White painted many murals in the public buildings at Washington, D. C. Mark Catesby's illustrations for a Natural History of Carolina, Florida, and the Bahamas (1722) rank with John Audubon's famous pictures of birds, painted a century later in the woods around A type of pottery nationally Charleston. known for its charm is fashioned by the Catawba Indians, who live on a small reservation in York County. Interest in art is maintained by the Gibbes Art Gallery in Charleston, and by the privately endowed Brookgreen Gardens, which have many beautiful and famous examples of American sculpture.

Since the presentation of one of the first opera performances in America at Charleston in 1734, music and drama have been important in the culture of South Carolina. The St. Cecilia Society of Charleston, formed in 1762, sponsored the first symphony orchestra in America and the first open-air concerts. The chants and spirituals of the Gullah Negroes deeply influenced George Gershwin in the writing of Porgy and Bess (1936), as they did South Carolina's most famous composer, Lily Strickland, who wrote Lindy Lou and Honey Chile. The Gullah music is being preserved by the Society for the Preservation of Spirituals, at Charleston.

Early literature of the state was mostly political and historical writing; John C. Calhoun's great speeches pleading the cause of states' rights rank with the best of their day. Modern writers who have won national repute include Archibald Rutledge, poet; DuBose Ĥeyward and Hervey Allen, novelist-poets; and Julia Peterkin, interpreter of Negro life.

Religion. The early English settlers were loyal to the faith of King Charles II, who had just regained his throne and re-established the Church of England (Episcopal). However, the charter of the colony was extremely liberal in its statements on religious beliefs, and the tolerance with which religious differences were viewed may best be illustrated by the fact that the first governor, William Sayle, was a Nonconformist. Before 1690, many dissenters-Calvinists and Baptists—came from England and New England, and Huguenots (French Protestants) from France. A few wealthy Jews, who had financed boatloads of settlers from England, joined the colonists in this period. Before the Revolutionary War, Scotch-Irish Presbyterians, German Lutherans, Quakers, Baptists, and other Protestant groups settled in the upcountry. Not until the adoption of the second state constitution in 1778, however, was complete freedom of worship granted, and not until 1790 were members of all religious denominations permitted to vote or hold office.

Today the church membership in proportion to population is larger than in any state except Utah. The largest denominations, in order, are the Baptists, Methodists, Presbyterians, Lutherans, Roman Catholics, and Orthodox Jews. Since World War I, a number of Pentecostal sects have increased rapidly in mem-

Social Welfare. The State Board of Health, established in 1870, has done excellent work in educating the Negro, lowering the death rate among infants, and controlling plagues especially prevalent in the South: malaria, hookworm, and typhoid fever. The board also has been active in controlling industrial diseases in textile, glass, paper, pottery, tobacco, and food-manufacturing plants, and offers many health services to industrial workers. An industrial commission created in 1935 administers workmen's compensation laws. In 1936, an unemployment compensation commission was set up. A law was passed in 1937, prohibiting the employment of children under sixteen in mines and factories. In 1938, South Carolina limited working hours to forty a week in the textile industry, anticipating Federal legislation by several months.

Recreation and Outdoors

South Carolina is one of the most popular vacation states of the South. To its seashore and mountain resorts come thousands of persons each year for both winter and summer recreation.

The most famous winter resorts are at Aiken and Camden in the sand-hill region, where polo. horseback riding, drag and fox hunts, golf, and tennis are the chief sports. Sportsmen come in the fall to shoot wild turkey, duck, quail, bear, and deer. Fishing in fresh and salt water are year-round sports. From December to May, the blossoming gardens of the coast, especially those near Charleston, draw visitors from all parts of the United States.

State and National Parks and Forests. More than one million acres have been set aside by the state and nation as parks and forests. The national forests include Francis Marion (414,-700 acres) on the coast, and Sumter (1,007,904 acres), which has three divisions: Enoree, near Chester; Long Cane, bordering the Savannah River; and a section in the Blue Ridge Moun-

Among the state parks, most of which have facilities for picnicking and camping, are:

Cheraw (7,562 acres), near Cheraw. Beach along 360-acre lake in sand-hills region. Camping, boating,

300-acre take in sand-nitis region. Camping, boating, and fishing. Created, 1934.
Edisto Beach (1,255 acres), on Edisto Island. Oak and palmetto forest and high dunes overlooking the bathing beach. Created, 1935.
Kings Mountain (6,166 acres), near Blacksburg, in the Piedmont Region. Scene of the battle that turned the tide of the Revolution in the South. Bathing beach on lake; hardwood forest. Created,

Myrtle Beach (320 acres), near Myrtle Beach. Sand dunes overlooking the sea; hiking trails through dense longleaf pine forest. Created, 1934.

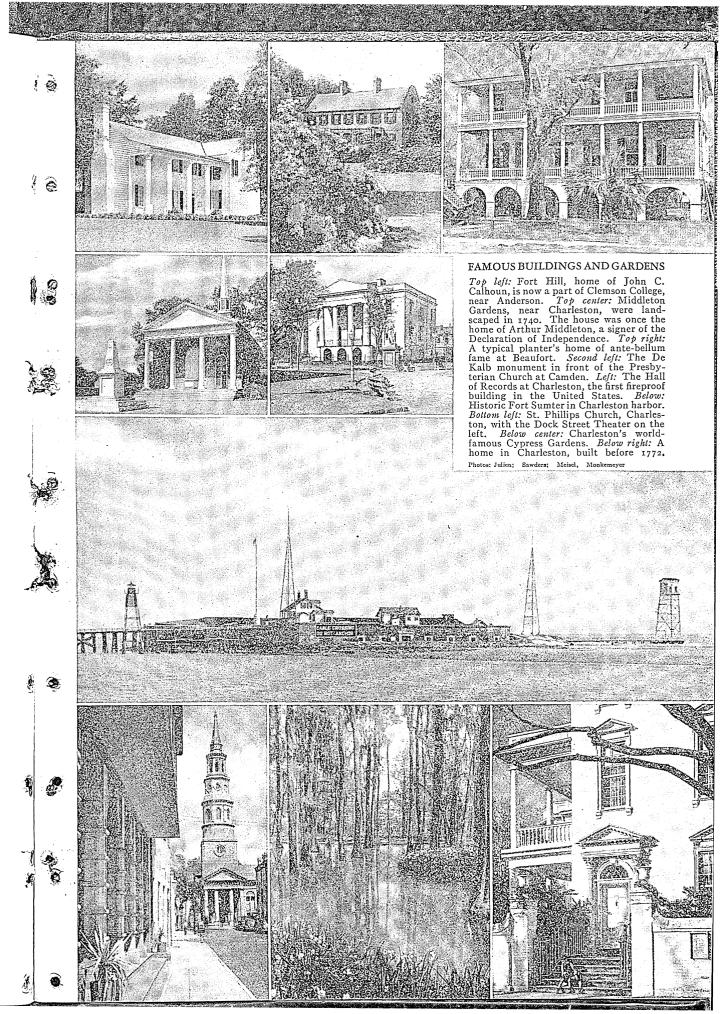
Sesqui-Centennial (1,500 acres), near Columbia. Named to commemorate the 150th anniversary of the founding of Columbia. Lake set in a pine forest. founding of Columbia. Lake set in a pine forest.

Created, 1936.
Table Rock (2,860 acres), near Greenville. Table Rock (2,800 acres), near Greenvine. I rans lead past beautiful waterfalls to the summits of Table Rock and Pinnacle mountains, where, say Indian legends, a huge chieftain dined 3,000 feet above ordinary mortals. Trout streams and large artificial lake. Created, 1935.

Other Interesting Places to Visit. Carolina is noted for its historical associations as well as for its beautiful houses and gardens. Among the spots that attract many visitors are:

Battlegrounds. Camden, where Gates was defeated by the British in 1780; Cowpens, near Gaffney, where Morgan and Pickens defeated the British in 1781; Eutaw Springs, near St. Matthews, where a holding action by General Green in 1781 hastened the British retreat to Charleston. *Hobkirk Hill*, at Camden, where Green, though defeated, forced the British to evacuate the town, April, 1781. See REVOLUTIONARY WAR IN AMERICA.

Camden. Ivy Lodge, home of Dr. Simon Baruch, first surgeon to perform a successful operation on a perforated appendix (1881); Camden Hospital, a memorial to Dr. Baruch donated by his son, Bernard M. Baruch; Court Inn, supposedly inhabited by a ghost, the 'Grey Lady,' who foretells disaster; De Kalb



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Monument, designed by Robert Mills, dedicated in 1825 by La Fayette, commemorates DeKalb's aid in the American Revolution and his fall at the Battle of Camden; Old Courthouse, built from designs by Robert Mills, 1826; many beautiful and historic homes.

Camps. Fort Jackson, near Columbia, whose huge military population made it the third city of the state in World Wars I and II; Camp Cross, near Spartanburg, a large army training camp in World

Charleston. Heyward Washington House, built in 1730 for a signer of the Declaration of Independence, and visited by Washington; Old Exchange, now a museum, built in 1771 as a customs house, and used museum, built in 1771 as a customs nouse, and used as a prison for pirates and for American patriots during the British occupancy of the city; Missroon House, built in 1705 on the foundations of Granville Bastion, one of the city's earliest defenses (1680), Sword Gates and Sass Gates, excellent examples of early ironwork; City Hall, contains important portraits and historic relics; Fire proof Building, designed traits and historic relics; Fireproof Building, designed by Robert Mills in 1826, first fireproof structure in the United States; Gibbes Art Gallery, containing fine permanent exhibitions of portraits and miniatures; Old Powder Magazine, built in 1703, now a museum; Planters Hotel and Dock Street Theatre, restorations of famous buildings of the past; College of Charleston, oldest municipal college in the country; Medical College, oldest medical school in the South; The Citadel, military school; Charleston Museum, interesting exhibits of early colonial life. In Charleston Harbor is Castle Pinckney, whose fortifications were Harbor is Castle Pinckney, whose fortifications were built in 1810; it became a national monument in 1924.

Churches. In Beaufort, St. Helena Episcopal, built 1724. In Charleston, Huguenot (French Protestant), founded 1680; St. Philip's Episcopal, parish organized 1680, present church built 1835-1838; St. Michael's Episcopal, noted for its graceful spire, erected 1752; First Baptist, designed by Robert Mills, erected in 1820 on site of old church whose members organized the first Baptist communion in the Carolinas in 1683; Circular Congregational, erected on site of White Meeting House, where Calvinist Dissenters worshipped in 1680; St. Mary's Catholic, built in 1838 for the mother parish of the Roman Catholic Church

for the mother parish of the Roman Catholic Church in the Carolinas, organized in 1794; St. John's Lutheran, built 1815, has beautiful wrought-iron gates. In Columbia, First Baptist, where the Ordinance of Secession was passed on Dec. 17, 1860.

Columbia. State House, containing important historical portraits, murals, and relics; University of South Carolina, whose library numbers among its priceless possessions Audubon's The Birds of America (elephant folio edition, 1827-38); Woodrow Wilson Museum, Wilson's boyhood home.

Indian Mounds. The largest, near Sumter, 50 feet high and 800 feet in circumference, contained many

high and 800 feet in circumference, contained many interesting Indian relics and buried bones; another, near Camden, is 30 feet high and 160 feet in circumference.

Fort Hill, near Anderson. Home of John C. Cal-houn, champion of states' rights and nullification of

Forts. Blockhouse, on state line north of Spartanburg, trading post and frontier fort in Indian wars; Charlesfort, remnant of early settlement by Huguenots at Port Royal; Fort Johnson, in Charleston Harbor, seized from the British by Americans in 1765 in defiance of the Stamp Act; Fort Moultrie, in Charleston harbor, where men-of-war of the British fleet were routed, June, 1776; Fort Sumter, in Charleston Harbor, where the first cannon shot was fired in the War between the States, in 1861; Windmill Point, near Charleston, where Governor Sir Nathaniel Johnson successfully defied French and Spanish fleets in Queen Anne's War, 1702.

Gardens. Belle Isle and Brookgreen, near Georgeat Port Royal; Fort Johnson, in Charleston Harbor,

Gardens. Belle Isle and Brookgreen, near Georgetown; Cypress, Middleton, Runnymede, Magnolia, near Charleston; Edisto, near Orangeburg; Kalmia, near Hartsville; Swan Lake, near Sumter.

Parris Island, near Beaufort. Large Marine Corps training base.

Government

National: Electoral votes, 8. Representatives in Congress, 6. State: State: Senators, 46; representatives. 124. Capital, Charleston, 1670-1786; Columbia since 1786.
Counties: 46.

South Carolina is governed under the constitution adopted in 1895, the sixth since the beginning of the Revolution. Amendments may be proposed in either house of the legislature, and become law after approval by two thirds of the members of each house and by the people. Constitutional conventions may be called by a two-thirds vote of approval in each house and a majority vote of the people. The state constitution has several unusual and important provisions against lynching; it also prohibits divorce for any cause, and denies the right to hold office to any person who does not believe in the existence of a Supreme Being.

Executive officers include the governor, lieutenant governor, secretary of state, comptroller general, attorney general, treasurer, adjutant and inspector general, secretary of agriculture, and superintendent of education, all elected for four years. The governor may not succeed himself.

Legislative power is vested in a general assembly consisting of a senate, half of whose members are elected every two years, and a house of representatives, whose members are elected for two years.

Judicial power is vested in the supreme court, circuit courts, courts of common pleas, courts of general sessions, and justice courts. chief justice of the supreme court and four associate judges are elected by oral vote in the general assembly for a term of ten years. Fourteen circuit judges are elected in the same manner for four-year terms. Justices of the peace are elected by the people.

Local Government is centered in the county or the municipality. Counties are generally administered by commissions elected by the Since the county has no legislative body, local statutes are decided upon by the senators and representatives and presented to the general assembly. This system puts a heavy burden on the legislature, and gives the legislators unusual powers. Municipalities are subject to legislative authority of the general assembly, but may use some discretionary powers, such as giving new industries relief from taxes. Sumter was the first city in the state to adopt the city-manager form of government, in June, 1912. In 1923, the legislature empowered all cities of 20,000 to 50,000 population to adopt this system.

National Politics. During the uneasy years before the War between the States, John C. Calhoun, George McDuffie, and Robert Y. Hayne defended states' rights. They favored



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nullification of the high tariffs imposed by the northern industrial states, and finally stood for secession. However, until the eve of secession, the northwestern counties were strongholds of Union sentiment, led by Benjamin F. Perry of Greenville and by the great Charleston lawyer, James L. Petigru. When war broke out, South Carolina was the first state to draw up an Ordinance of Secession. Since 1876, the state has voted the Democratic ticket in national elections. See POLITICAL PARTIES (chart).

Famous South Carolinians

South Carolina has had many renowned sons and daughters (see BIOGRAPHIES, in list of related subjects). Among others who have achieved state, national, and international fame are:

Baruch, Bernard M. (1870-), born at Camden. Financier and economist who served as economic adviser to the United States government in World Wars I and II. His father, Dr. Simon Baruch (1840-1921),

was a famous surgeon.
Coker, David R. (1870-1938), born in Hartsville.
Known wherever cotton is grown for the long-staple members of the Coker family have been agricultural experts and economists who have contributed to the

experts and economists who have contributed to the prosperity of the South.

Gadsden, Christopher (1724-1805), born in Charleston. Revolutionary orator and soldier who led the agitation for independence in South Carolina. His grandson, James Gadsden (1788-1858), born in Charleston, made the Gadsden Purchase (which see) in 1854 while serving as minister to Mexico.

Gildersleeve, Basil Lanneau (1831-1924), born in Charleston. One of America's leading philologists, and among the first professors at Johns Hopkins

and among the first professors at Johns Hopkins

University. Wrote several classical studies.

Gregg, William (1800-1867), born near Carmichaels, W. Va. Quaker cotton manufacturer, the father of the southern textile industry, who devised the mill-village system.

the mill-village system.

Grimké, Archibald Henry (1849-1930), born near Charleston. Negro lawyer, author, publicist, student of Negro welfare problems.

Grimké, John Faucheraud (1752-1819), born in Charleston. Jurist, Revolutionary leader, special pleader in England for the cause of the colonies. His daughters, Sarah Moore (1792-1873) and Angelina Emily Grimké (1805-1879) were brilliant pleaders for Emily Grimké (1805-1879) were brilliant pleaders for the antislavery cause among Southern women; his son, Thomas Smith Grimké (1786-1834), opposed secession (which see), pioneered in the causes of temperance and world peace.

Lucas, Elizabeth [Eliza], later Mrs. Charles Pinckney (about 1722-1792). See Women, Great American (Women of the Revolutionary Age).

Mills, Robert (1781-1855), born in Charleston. Designer of the Washington Monument in Washington, D. C., and of many homes, churches, public buildings, and canals in his home state.

Petigru, James Louis (1780-1863), born in Abbey-

Petigru, James Louis (1789-1863), born in Abbeyville District. Lawyer, political leader of great in-tegrity who helped compromise the nullification (which see) controversy on high tariffs; remained loyal to the Union.

Pickens, Andrew (1739-1817), born near Paxtang, Pa. Indian fighter and Revolutionary soldier who was made a brigadier-general for his brilliant leadership in the Battle of Cowpens.

Sumter, Thomas (1734-1832), born near Charlottesville, Va. Continental officer and partisan fighter, known as "The Gamecock." Leading small

bands of fighters, he defeated the British Regulars in

wany remarkable skirmishes in 1780-1781.

Waddell, Moses (1770-1840), born in Iredell County, N. C. Pioneer educator, founder of school at Willington attended by many famous leaders and educators of the South.

Woodward, Henry (1646-1686), probably born in the Barbados. Surgeon, first English settler in South Carolina. He surveyed Carolina for settlement in 1665, and planted the first rice fields in 1680. Served as interpreter and agent to the Indians.

State Symbols and Events

State Seal. The palmetto growing out of a fallen oak symbolizes the victory of the Revolutionary defenders of a palmetto log fort over a fleet of British men-of-war, built of oak. The figure of a woman represents Hope. Also on the seal are two Latin phrases: Quis Separabit (Who shall separate us?) and Animas



Opibusque Parati (Ready in Soul and Resource).
State Flag. See UNITED STATES OF AMERICA (color plate, Flags of the States). State Motto. Dum Spiro, Spero-While I breathe,

I hope State Bird. Mockingbird. See BIRDS (color plate, State Birds).

State Flower. Yellow jasmine.
State Tree. Palmetto.
State Song. Unofficial, but popularly sung throughout the state, is "South Carolina," with words by Henry Timrod and music by Erroll Hay Colcock.

Annual State Events. Among the interesting festivals and expositions that bring visitors to South Carolina during the year are:

Polo Games, Aiken and Camden, three times weekly,

January through March.
St. Cecilia Ball, Charleston, in January (no fixed date).

Columbia Music Festival, Columbia, first week in April.

Southern Textile Exposition, Greenville, every even-numbered year, in April (no fixed date).

Azalea Festival, Charleston, in April.

Confederate Memorial Day, state-wide, May 10.

Tobacco Festival, Mullins, first week in August. Singing Convention, Greenville, second week in

Gotton Festival, Camden, in September (no fixed date). August.

state Fair, Columbia, third week of October. Palmetto State Fair (Negro), fourth week of

Junior Davis Cup Match (tennis), Clinton, in the summer (no fixed date).

History

- 326 First Spanish settlement by De Ayllon. 329 Grant of "Carolana" to Sir Robert Heath by King 1629
- Grant of Charles I.
- New grant of same territory to eight lords proprietors by Charles II.

- Charles II.
 1670 First settlement by English near Charles Town.
 1710 Authority of lords proprietors overthrown.
 1720 South Carolina became a royal province.
 1776 Independent government set up.
 1780 Charleston captured by British; British forces defeated at
 Kings Mountain.
 1780 First cotton mill established in Charleston.
- 1800 Santee-Cooper Canal completed. 1832 Ordinance of Nullification passed (repealed by com-

- ordinance of realistation passes (cpeans by comprenies in 1833.)
 Secession of South Carolina from the Union.
 Fort Sumter captured by Confederates.
 Columbia burned by General Sherman.
 Wade Hampton elected governor, and Reconstruction riod ended.
- 1880 Electrically powered textile industry begun.

1901-1902 South Carolina Interstate and West Indian Exposition held at Charleston.
 1930 Dreher-Shoals power dam completed.
 1941 Factories converted to war production, and many vital troop-training centers established.

Indian Days. South Carolina originally was inhabited by at least twenty-eight tribes of Indians, each with its own language and customs. The Cherokee and Yamasee were probably the most advanced; they lived in wellfortified villages of log huts, and had a domed council house where the tribal elders met.

Exploration and Settlement. Spaniards from the island of San Domingo explored the coast in 1521. An expedition of Spaniards led by De Ayllon attempted a settlement near Winyah Bay in 1526, as did the French Huguenots around Port Royal in 1562, but both colonies were abandoned. Charles I of England granted the Carolina region to Sir Robert Heath in 1620. Because of the civil war in England, however, it was not until Charles II was restored to the throne in 1660 that serious attempts were made to found settlements. granted Carolina to eight lords proprietors, and in 1663-1664 a commission explored the region.

The first permanent settlement was made in 1670 on Albemarle Point. Ten years later, it was moved to Oyster Point on the Ashley and Cooper rivers, and named Charles Town. This was the southern outpost of the English against the Spanish and French until the close of Queen Anne's War in 1713. An uprising by the Yamasee Indians threatened the existence of the colony in 1715-1716, but they were decisively defeated near Charles Town.

Dissatisfaction with rule by the proprietors, under an elaborate form of government devised by John Locke and called the "Fundamental Constitution," brought on a revolt in 1719. For two years the colony was self-governed, but, in 1721, a provisional governor was appointed. In 1720 the region was divided into two crown provinces, North Carolina and South Carolina.

Revolutionary Days. The beginning of the colonists' struggle for independence found South Carolina divided against itself. Its ties to the mother country were strong, for it had grown prosperous through exports to England, and the aristocrats who had made Charles Town the social and cultural center of the South regarded England as their spiritual home. The tradition of self-government was strong, however, and the growing planter-merchant class included many who, because of oppressive taxes, supported the patriot cause. Of the 137 engagements of the Revolution fought in South Carolina, many were between Tories and Whigs.

In 1776 a patriot government was set up under a temporary constitution. This government soundly defeated the British land and sea

forces at Charles Town in June, 1776, and changed the name of the city to Charleston. Four years later, the British attacked again and, after a two-months' siege, captured Charleston Harbor. Many of the foremost patriots were imprisoned. However, Francis Marion and Andrew Pickens defeated the British regulars in skirmish after skirmish, until there came the great victories at Cowpens and Kings Mountain, which broke the grip of the British on the southern colonies. South Carolina had contributed more money to the Revolution than any other colony except Massachusetts, and as much as all the other colonies combined.

Early National Period. The South Carolina delegates, especially Charles Pinckney, wielded great influence in the drafting of the Constitution of the United States. They fought for maximum protection of the interests of property and for states' rights, both vital to the survival of the slave system. After adoption of the Constitution by the convention at Philadelphia, the South Carolinians faced the task of pushing through state ratification. Strong factions in both the upcountry and the lowcountry bitterly opposed the Constitution because of its broad grant of powers to the Federal Government, and only by the skillful leadership of Charles and Thomas Pinckney and other Federalist leaders was it ratified on May 23<u>,</u> 1788.

In 1790, the capital was moved to Columbia, after agitation by the upcountry for a more central location than Charleston. In 1808, the political conflicts between the low country, or rich planter faction, and the Scotch-Irish settlers of the upcountry were settled by reapportionment in the legislature. The state was strongly anti-Federalist, and ardently advocated states' rights and free trade. In 1832, when the Clay Tariff Act was passed by Congress, South Carolina passed the Ordinance of Nullification, declaring the act null and void in the state, and secession was averted only by compromise.

War between the States. South Carolina, with the adoption of the Ordinance of Secession in December, 1860, was the first state to secede from the Union. The first shot of the war was fired at Fort Sumter in Charleston Harbor on April 12, 1861. In the great conflict, the state lost one quarter of its 63,000 soldiers. Charleston was bombarded from the sea and the Capitol at Columbia was burned. In Sherman's march from Savannah, Ga., much of the plantation system was destroyed, and it has never wholly recovered.

Reconstruction. From 1868 to 1874 the whites who had fought in the war were not permitted to vote. Irresponsible, uneducated Negroes and white carpetbaggers (which see) from the North dominated the government. A few able and educated Negroes, however, left important memorials to their talents, notably the school system devised in 1868 by Francis L. Cardoza. Rule by native whites was re-established with the election of Wade Hampton as governor in 1876.

State Progress. For fourteen years, the conservative low country controlled the state government, but the farmers of the upcountry became insistent on more power. In 1890, Benjamin R. Tillman led a successful revolt against the tidewater regime. As governor, he established agricultural and vocational education and strengthened the principle of democracy. He also created the State Dispensary, an experiment in state sale of liquor.

Rapid industrial expansion, which began about 1880, placed South Carolina among the leading states in the manufacture of cotton goods. Since 1915, great hydroelectric development and improved transportation have stimulated the growth of all industries and made South Carolina one of the greatest potential manufacturing regions of the nation.

In World Wars I and II, South Carolina not only provided men and military equipment, but also was the site of huge training centers, including Fort Jackson, Camp Sevier (War I), Camp Croft (War II), the permanent Marine Base on Parris Island, and the United States Navy Yard at Charleston.

Related Subjects. The reader is referred to:

CITIES Columbia

Charleston

BIOGRAPHIES

Allen, Hervey
Allston, Washington
Burr, Theodosia
(see Burr, Aaron)
Calhoun, John Caldwell
Cohen, Octavus Roy
Hampton, Wade
Hayne, Paul Hamilton
Hayne, Robert Young
Johnson, Andrew
Kellogg, Clara Louise
Laurens, Henry
, ,

Longstreet, James Marion, Francis Moultrie, William (see FORT MOULTRIE) Peale, Rembrandt Pinckney, Charles Cotesworth Rutledge, John Simms, William Gilmore Stanton, Frank Lebby Summerall, Charles Pelot Tillman, Benjamin Ryan Yancey, William Lowndes

Carpetbaggers Fort Moultrie Fort Sumter Ku-Klux Klan Nullification

Reconstruction Revolutionary War States' Rights Submarine War of Secession

PRODUCTS

HISTORY

Cabbage Cypress Hog Cattle Kaolin Corn Cotton Oyster Phosphate Crab

Pigeon Rice Shrimp Tobacco Turpentine

Books for Adults

HENNIG, HELEN KOHN. Great South Carolinians. University of North Carolina Press, 1940. Biographies of men from colonial times.

Leidling, Harriette K. Charleston: Historic and Romantic. Lippincott, 1931. Illustrated history from earliest settlement.
ROBERTSON, BEN. Red Hills and Cotton. Knopf,

1942. Story of the author's own family.

RUTLEDGE, ARCHIBALD H. Home by the River. Bobbs,

1941. Story of the author's ancestral home.

SABATINI, RAFAEL. Carolinian. Houghton, 1925.
South Carolina during the Revolutionary War.

SETON, ANYA. My Theodosia. Houghton, 1941.
Fictionized but historically accurate account of the

daughter of Aaron Burr.

South Carolina: a Guide to the Palmetto State. Oxford, (American Guide series). Excellently illustrated, descriptive guide.

Books for Younger Readers

GOVAN, CHRISTINE N. Carolina Caravan. Houghton, 1942. A summer on an island in South Carolina. GRAY, ELIZABETH J. Beppy Marlowe of Charles Town. Viking, 1936. A little girl accompanies her brother Rolfe from London to their Carolina

plantation in 1715.

MEANS, FLORENCE C. Shuttered Windows. Houghton, 1938. Visting her great-grandmother on a South Carolina island, a Negro girl decides to stay and

help educate her people.

Palmetto Pioneers. Bryan, 1938. (Writers' Program.)
Six stories of early South Carolinians.

SUBLETTE, CLIFFORD MACCLELLAN. Scarlet Cockerel.
Little, 1925. Story of the French Huguenot colonists colonists.

Questions on South Carolina

(An Outline suitable for South Carolina will be found with the article "State.")

What rare and curious flower, which serves as trap for capturing insects, grows in South Carolina?

By what famous South Carolina architect was the Washington Monument in Washington, D.C.,

What South Carolinian was the first surgeon to perform a successful operation on a perforated appendix?
Why is South Carolina sometimes called the

mother of the free public libraries of America?

Who introduced rice into South Carolina? When? In what sections was it grown?

Why did Charleston become the social center for the plantation aristocracy?

What great South Carolina statesman was the champion of states' rights? On what college campus may his home be seen?

For what was each of the following famous: Elizabeth Lucas, James Gadsden, Kings Mountain, Fort Sumter, Parris Island, Middleton? What is the Fall Line? Through what counties

does it run in South Carolina? What connection does it have with the rise of industry in the state?

In what part of the state is the tidewater

country? Why is it so called?

When was cotton first grown in South Carolina? What particular variety was especially grown? Why was this so much demanded by English mill owners?

In what counties are the following products most widely grown: pecans, peanuts, straw-berries, tobacco, cotton?

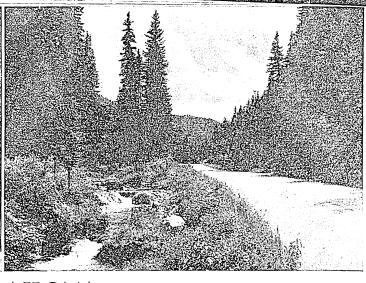
Who was the great English philosopher who helped to draw up the early instrument of gov-

ernment for the colony? How do you account for the fact that the growth of industries has been greatly stimulated in South Carolina since 1915?

SOUTH CENTRAL STATES. See United STATES (Wealth in the Farms; Natural Resources); pages 7383, 7384.

SOUTH CHINA SEA. See CHINA SEA.





SOUTH DAKOTA THE SUNSHINE

SOUTH DAKOTA, dah ko' tah, is named for the Dakota (Sioux) Indians, who conquered the region from other tribes before the white men settled there. It is popularly known as THE SUNSHINE STATE, because of its sunny climate. Lying where the prairies of America rise to the Great Plains, South Dakota is a state "full of distance." Here are no thickly populated cities, but mile upon mile of fertile farm land and windswept grasslands stretching to distant horizons.

The modern South Dakotan is noted for his steadfast courage in fighting the elements to make the earth yield abundantly. His optimism and faith in the land have kept him at his task through the lean as well as the prosperous years. His political and economic progressiveness is expressed in the efficiency of his state government and in the many co-operatives through which he and his neighbors market their crops. He gains inspiration and example from his pioneer parents who settled the land—the hardy prospectors who panned gold in the Black Hills, and the Scandinavian and Yankee farmers who battled Indians, drought, and grasshoppers to make South Dakota one of the great farming regions of the United States.

South Dakota is notable among the prairie states for the variety of its crops. The prosperous farms east of the Missouri River produce huge yields of varied farm products. South Dakota ranks second among the states in the raising of barley and rye, and in the cutting of native grasses for hay. Few states surpass it in the growing of flaxseed, sorghum, and oats. In the high plains of the west, South Dakota is ranch country, where thousands of cattle and sheep graze on the grassy ranges.

Since Custer's men found gold in 1874, the Black Hills of South Dakota have poured forth a glittering mountain of mineral wealth. This region produces more gold than is mined in any other state except California. From the Homestake Mine at Lead, largest gold mine in the

Western Hemisphere, precious metal worth hundreds of millions of dollars has been taken. South Dakota also ranks high in the mining of silver, and the Black Hills contain some of the largest deposits of lithium (the lightest metal known) in the world.

Both vacationists and scientists are attracted to the scenic wonderland of the Black Hills and to the picturesque Bad Lands, a region of grotesquely carved rock and clay. The exposed rock formations of the Black Hills tell the story of the making of the earth's outer shell, almost as far back as the earliest-known geological age, and they are visited by students of geology from many parts of the United States. From the White River Bad Lands, one of the most important fossil beds known, the fossilized bones of prehistoric animals are taken for museums throughout the world.

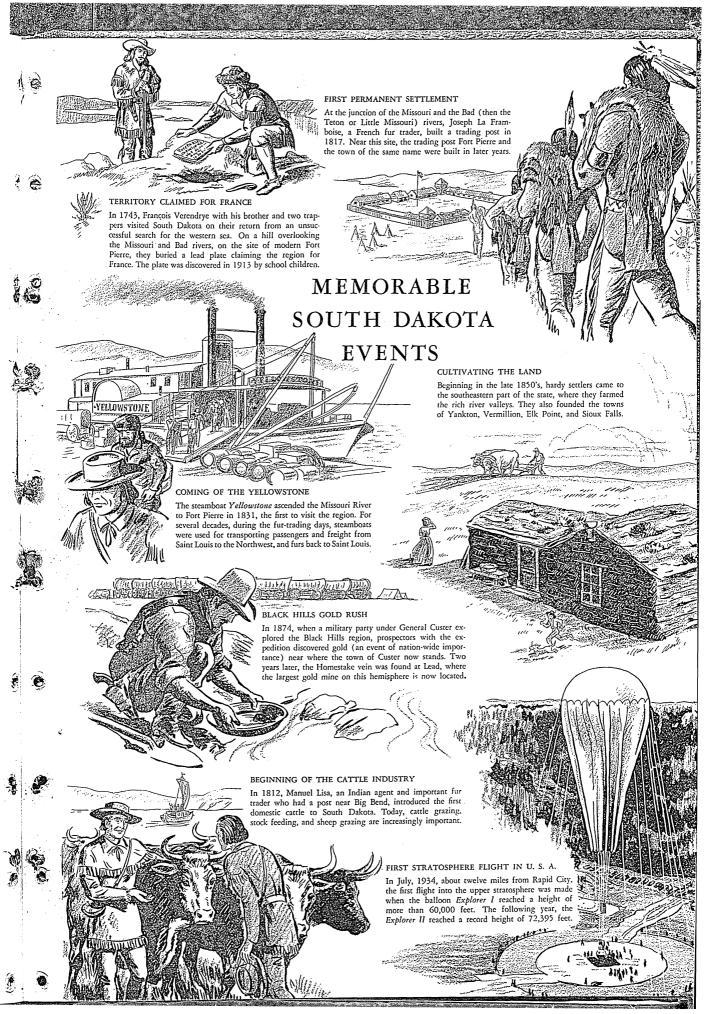
The great beauty of the rock formations in their setting of rich, dark forest has made the Black Hills one of the most popular vacation areas in the country. Near Rapid City is the Mount Rushmore Memorial, sometimes called "the shrine of democracy," where the likenesses of Washington, Jefferson, Lincoln, and Theodore Roosevelt are sculptured in eternal granite on the mountainside. The great size of this crowning work of the sculptor, Gutzon Borg-lum, is indicated by the fact that Lincoln's nose is longer than the entire face of the Sphinx, in Egypt. Spearfish is the home of the famous Black Hills Passion Play.

The Land and Its Resources

The Land and Its Resources

Extent: Area, 77,047 square miles (511 square miles of which are inland water), fitteenth in size among the states. Greatest length, 245 miles; greatest width, 380 miles.

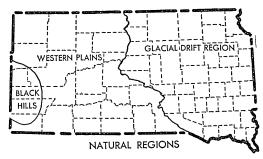
Physical Features: Mountains, Black Hills. Elevation, highest, Harney Peak in Pennington County, 7,242 feet; lowest, Big Stone Lake in Roberts County, 962 feet. Chief river, Missouri (chief tributaries, Cheyenne, James, White, Big Sioux, Vermillion). Chief lakes, Andes, Big Stone, Enemy Swim, Kampeska, Lake of the Pines, Sylvan, Traverse, Waubay. Climate: Temperature, average annual, 45.3°; average summer, 70.1°; average winter, 19.1°; lowest on record, -58° at McIntosh (Feb., 1936); highest on record, 120° at Grannvalley (July, 1936). Precipitation, average annual, 18.97 inches; average Apr. 1 to Sep. 30, 14.44 inches; average Oct. 1 to Mar. 31, 4.53 inches. Snowfall, average annual, 36.1 inches.



Location, Size, and Surface Features. South Dakota, roughly rectangular in shape, lies almost in the exact center of North America. A monument near Pierre, the capital, marks the center of the state and the approximate center of the continent. The state is somewhat larger than Indiana and Kentucky combined. For the boundaries of South Dakota, see the colored map.

South Dakota is divided into three natural regions: the Glacial Drift Region, the Western

Plains, and the Black Hills.



The Glacial Drift Region comprises the area in South Dakota which ages ago was covered by great ice sheets (see GLACIAL EPOCH). It is generally flat except for river valleys, moraines (heaps of earth and stone deposited by glaciers), and coteaux (high rolling areas with lower land on either side, formed by glacial action). Heaps of boulders left by the glaciers are seen beside the fields, placed out of the way of the plow.

The Western Plains Region, west of the Missouri River, is part of the Great Plains Region of the United States. The high, level land, broken by deep river valleys, slopes gently toward the Missouri. Landmarks of the plains are the buttes, some of which are so high that they can be seen for miles. Most of these are remnants of a great plain that once extended for hundreds of miles along the Rocky Mountain front, the greater part of which has dis-

appeared through erosion.

In this region are the White River Bad Lands, a maze of curiously carved ridges and mounds from which rise grotesque rock pinnacles and columns. Most of this section is bare of vegetation, but some of the hollows and mesas are used for grazing. Here are found some of the most important fossil deposits in the world, containing the fossilized bones of small three-toed horses, humpless camels, saber-toothed tigers, and other prehistoric animals.

The Black Hills, actually mountains, rise in the southwestern part of the state. Formed by the pushing up and folding of great rock layers, and by volcanic action, they are broken and rugged. This region of massive rock and lofty pines is one of the beauty spots of America. None of the peaks extends above timber line. The Black Hills furnish large quantities of lumber and water power, and contain especially rich mineral deposits. There is some farming in the small mountain valleys.

Lakes, Rivers, and Artesian Wells. Most of the lakes were formed during the Glacial Epoch, when drainage water was dammed behind moraines. These are located mainly in the northeast. Lake Traverse, in the extreme northeastern corner of the state, drains by way of the Red River into Hudson Bay. Big Stone Lake, only a few miles away, drains through the Minnesota River into the Mississippi. Sylvan Lake and Lake of the Pines, in the Black Hills, are popular resorts.

The principal river is the Missouri, which crosses the middle of the state and drains most of its area. In the east, several streams drain glacial lakes and flow southward to join the Missouri as it swings toward the southeast. The streams in western South Dakota flow in a general eastward direction to empty into the great river, cutting deep valleys through the

high plains.

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The valleys of the James and Missouri rivers are underlaid with water that comes to the surface in artesian wells. There also are many such wells east of the James. Altogether, there are about 15,000 artesian wells in the state.

Climate. South Dakota is noted for its cloudless skies. Because the state is far removed from large bodies of water, there are many days of severe cold in winter and heat in summer. There also is considerable variation in climate in different parts of the state, due to its size and to the range in surface features from prairies to mountains. The Black Hills are the coolest part of the state in summer. The rainfall varies from more than 25 inches in the southeast to less than 15 inches in the northwest. In summer the prevailing winds blow from the south and southeast in the eastern two thirds of the state, and from the west in the western portion; in winter they are from the west and northwest.

Natural Resources. The great natural wealth in South Dakota is the soil. The glacial drift east of the Missouri River is fertile and normally receives sufficient rainfall for abundant crops. Most of the surface of Brown and Spink counties, in the northeast, is a flat plain of silt or loess (which see), which formerly was considered to be an ancient glacial lake bed. Although there now is some doubt as to its origin, its excellence as a wheat-growing region is

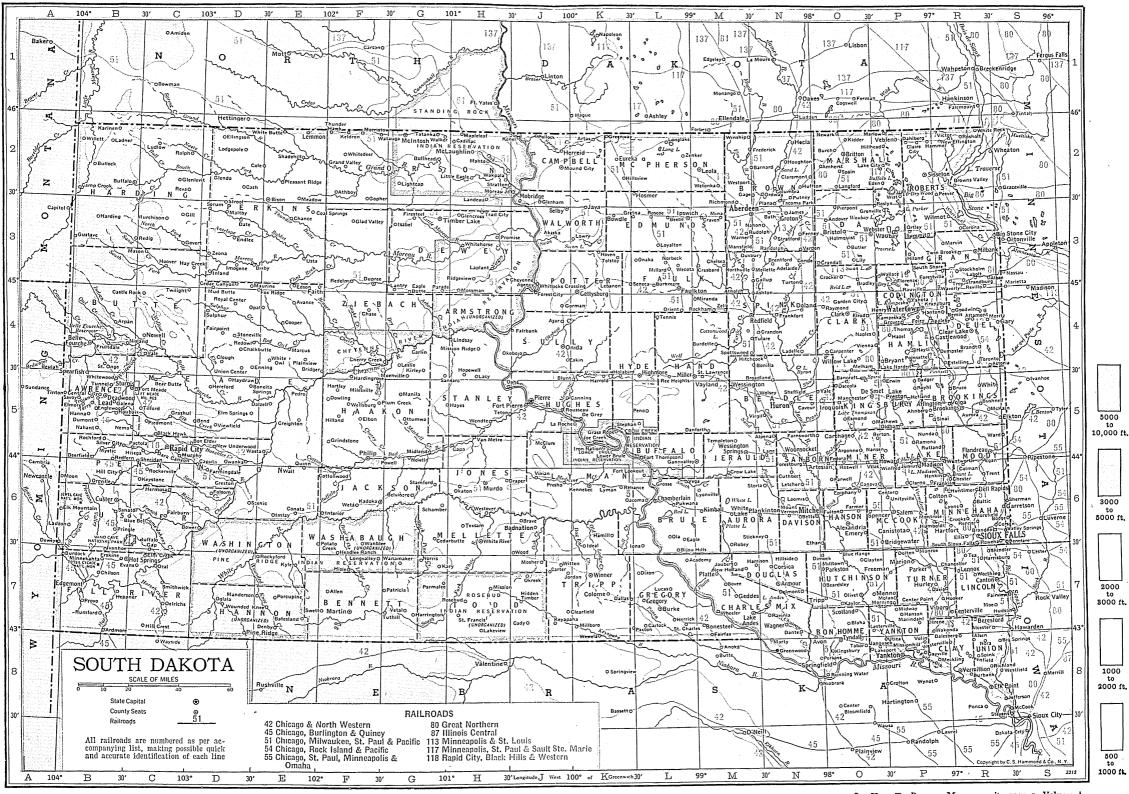
Pronunciation Guide

Belle Fourche bel foorsh' Bon Homme bahn hahm' Deuel doo' el Faulk fawk

Haakon haw' kahn Jerauld juh rawld' Lead lecd Ziebach zee'bah

SOUTH DAKOTA

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See How To READ A MAP, opposite page 1. Volume A

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beyond dispute. The land west of the Missouri River is fertile, but it normally receives too little rainfall for extensive cultivation of crops. It produces wild grass for range cattle and sheep.

In the northwestern counties are extensive fields of lignite (see COAL [Varieties]), which is mined for use within the state. Lignite also is found in a few other sections. Gold, silver, and other minerals are mined extensively in the Black Hills. This region also provides ponderosa pines for lumber, hydroelectric power from the dashing streams, and a rare scenic beauty that attracts an ever-increasing number of vacationists.

There are many deer in the Black Hills and in the northeast, and antelope are numerous west of the Missouri. Badgers, muskrats, skunks, and other small animals live in all parts of the state. Game birds include large numbers of waterfowl, which follow the Missouri on their north-south migrations in autumn and spring. Partridges, prairie chickens, and pheasants are found.

Conservation. The state and Federal governments have undertaken several projects to conserve water and soil. During the 1930's, hundreds of small lakes were formed by building earthen dams across gullies. These not only check soil erosion, but also retain drainage water in areas which frequently have insufficient rainfall for crops. Artificial lakes of greater size have been built near the larger towns and cities, particularly in the Black Hills, for recreational purposes. The Belle Fourche irrigation project, in the west, was developed by the Federal Government to irrigate 100,000 acres. A similar project was undertaken in the southern section of the Black Hills. During the early 1940's, Federal and state officials investigated the possibilities of damming the Missouri River to impound water for power

and irrigation. Wildlife is protected by the enforcement of closed-season and bag-limit laws. There are several game refuges in the Black Hills, and there is an antelope preserve in Harding County.

The People and Their Work

Population: 642,961 (1940), ranking thirty-seventh among the states. Density, 8.4 persons per square mile, ranking forty-first. Distribution, urban, 24.6 per cent; rural, 75.4 per cent. Largest cities, Sioux Falls (40,832), Aberdeen (17,015), Rapid City (13,844), Huron (10,843), Mitchell (10,633), Watertown (10617), Lead (7,520), Yankton (6,798), Brookings (5,346), Madison (5,018), Pierre (4,322).

Chief Products: Agricultural, dairy products, hogs, sheep and wool, chickens and eggs, turkeys, wheat, oats, barley, rye, corn, hay, sorghum, seeds, flax, sugar beets, potatoes, nursery products. Mineral, gold, silver, feldspar, mica. Manufactured, processed meats, butter, dressed poultry, lumber, cement, beet sugar, newspapers and periodicals.

The People. Many years ago, the Mound Builders (which see) lived in eastern South Dakota. When the white men came, they found two types of Indians in the region, the Arikara, or Ree, of Caddoan stock, who lived in permanent villages and cultivated gardens, and the nomadic Plains Indians, chiefly the Sioux. The Arikara were driven out of the South Dakota country by the Sioux in 1832. The Sioux comprise the greater portion of the present-day Indian population of more than 23,000. The Cheyenne, Crow Creek, Lower Brule, Pine Ridge, Rosebud, and Standing Rock reservations have been established for the Indians.

The first white men to come to the region were fur trappers and traders, who were not interested in colonizing. Not until the late 1850's was permanent settlement begun by farmers who came to the southeastern section from Minnesota and Iowa, and from foreign countries. Most of the settlers were of Norwegian, French, Swedish, Bohemian, German-Russian, Danish, and Dutch origin. So great was the immigration from foreign countries that by 1890 nearly one third of the population was foreign-born. Today, only about one tenth of the people are foreign-born, most of them being Scandinavian.

South Dakota is essentially rural in character, for there are few cities, and about three out of every four persons live on farms. Most of the residents of cities and towns gain their livelihood directly or indirectly from the products of the soil.

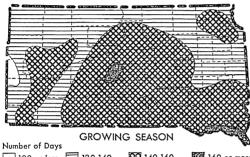
Agriculture produces many times the wealth gained from mines and factories in South Dakota. In general, a variety of crops are raised east of the Missouri River, where soil and climate are more favorable. The western region is devoted chiefly to the grazing of livestock and the growing of special crops, such as sugar beets, in irrigated portions. Only about 15 per cent of the farms are smaller than one hundred acres, and approximately 25 per cent are larger than five hundred acres. Although of per cent of the farms were operated by their owners in 1880, more than one half are now farmed by tenants.

Livestock and Dairving. Cattle and sheep are the chief source of income for the farmers in the Western Plains region, where the dry land is more suitable for grazing than for any other purpose. Butte County, on the western border, leads in the raising of sheep and lambs and the clipping of wool. However, because water is scarce and grass cover is so sparse that it takes many acres to support a herd of cattle, the western counties are far surpassed in beefcattle production by the lush green pastures along the eastern border. In this eastern region is Minnehaha County, which produces more beef and dairy cattle, milk, and milk products, and chickens and eggs than any other county in the state. Turkeys are raised on many South Dakota farms.

Field Crops. Corn, the leading field crop, is used mainly for fattening cattle and hogs.

The greatest corn production is in the southeastern section. Wheat is grown extensively throughout the state, with the largest crops of spring wheat in the northeast, and of winter wheat in the southeast. Large yields of oats, barley, rye, and flax are grown in the eastern half of the state. Sorghums are grown in both the eastern and western regions. Hyde, Hand, and McPherson counties lead in the raising of hay. Many farms specialize in the production of alfalfa, clover, and grass seed.

Near Belle Fourche, in Butte County, a Federal irrigation system established in 1908 makes possible the growing of sugar beets, alfalfa, small grains, and other crops. Sugar-beet production was greatly increased after a beet-sugar refinery was erected at Belle Fourche in 1927.



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Fruits, Vegetables, and Nursery Products. The hardier fruits, such as apples, plums, and cherries, are grown throughout the eastern part of the state. Potatoes also are an important crop in this region, with Deuel and Codington counties producing the largest yields. In the west, fruits and vegetables are raised extensively only in the valleys in or near the Black Hills. The Spearfish Valley in particular is noted for its fine apples and vegetables. Nursery products are grown in Yankton and Minnehaha counties, in the east, and in Pennington County, in the west.

The chief manufacturing Manufactures. enterprises are those which process agricultural products. Meat packing is the most important industry, with the largest packing plant at Sioux Falls, and others at Huron, Watertown, Mitchell, and Rapid City. The dressing and packing of poultry is centered in the eastern cities, where there also are many plants manufacturing butter, ice cream, and other dairy

Other industries include the refining of beet sugar, the milling of flour and livestock feed, and the manufacture of bakery products.

A state-owned plant at Rapid City manufactures Portland cement, and a factory at Belle Fourche makes brick and tile. There are sizable lumber mills at Rapid City, Spearfish, and Custer, and many other smaller ones in the Black Hills. Specially colored and designed jewelry is made from Black Hills gold at Dead-

Minerals. Mining activities are centered in the Black Hills, although there are some undeveloped mineral deposits in other parts of the state. Gold, most of which comes from the Homestake Mine at Lead, far outranks all other mineral products in value. Silver is a by-product of gold mining. Feldspar and mica are mined extensively in this region. Other minerals in the Black Hills, some of which have been mined, include lithium, tin, arsenic, tungsten, beryl, iron, vanadium, and lead.

The state contains widespread deposits of bentonite (a clay used in the manufacture of soap, oils, medical dressings, plaster, and other products), but only those near the Black Hills are worked. Limestone, used in the manufacture of cement, is quarried around Rapid City. Sandstone is quarried in the southern Black Hills, quartzite in the southeast, and granite in the northeast. One of the largest deposits of low-grade manganese ore in the United States is situated along the Missouri River in the south-central part of the state.

Transportation. To conquer the vast distances in South Dakota, the Sioux rode horses obtained from the Spanish in the Southwest, and the early fur trappers dragged keelboats by hand up the Missouri. Later, fur traders introduced flat-bottomed steamboats. In the gold-rush days, bull trains (wagons pulled by oxen or cattle) and stagecoaches carried goods and passengers from the steamboat landings to the diggings. This period in transportation was ended by the coming of the railroads, which entered the state in 1872, reached the Missouri in 1880, and the Black Hills in 1886. There are now more than 4,000 miles of railroads in the state. For a list of the railroads, see the colored

Tourists and those catering to the tourist trade, who sought easy routes to the Black Hills, and the farmers, who demanded improved farm-to-market roads, were largely responsible for the building of modern highways. Extensive highway construction began in 1919, when the legislature authorized a state trunk highway system. There are approximately 2,500 miles of hard-surfaced roads in the state. In 1921 the Legislature made appropriations for the construction of five toll-free bridges across the Missouri at advantageous points, to supplement an earlier toll bridge at Yankton. These displaced the ferries and linked the two halves of the state.

Press and Radio. In a state whose population is so scattered that there are fewer than nine persons to the square mile, newspapers, radio, and other means of communication are especially important. The first newspaper in the region was the Dakota Democrat, established at Sioux Falls in 1859. It was sponsored by the

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FACTORY (PLANTS AND MILLS) **MEAT PACKING**

NEWSPAPERS BUTTER

ALL OTHER INDUSTRIES CONTRACTOR POULTRY DRESSING

Based on latest U.S. Government statistics, prepared for the exclusive use of the WORLD BOOK ENCYCLOPEDIA by Pictograph Corporation

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Dakota Land Company to promote settlement in the Dakotas. The oldest newspaper in the state today is the Yankton Press and Dakotan, founded as the Weekly Dakotian in 1861, the year Dakota Territory was formed. The largest newspapers are the Argus Leader, published in Sioux Falls, and the Rapid City Journal. About 240 newspapers, of which sixteen are dailies, and approximately twenty periodicals are published in the state. The first radio station in South Dakota was WCAT, established by the School of Mines and Technology at Rapid City in 1921. Other leading stations include KABR, at Aberdeen; KSOO, at Sioux Falls; WNAX, at Yankton; and KOBH, at Rapid City.

Social and Cultural Achievements

Educational Institutions: Teachers' Colleges, Black Hills Teachers College (founded, 1883), at Spearfish; Eastern State Normal School (1883), at Madison; Northern State Teachers College, at Aberdeen (1001); Southern State Normal School, at Springfield (1897). Other Colleges and Universities, Augustana, Huron, and Yankton colleges; Dakota Wesleyan University; School of Mines and Technology; State College of Agriculture and Mechanic Arts; University of South Dakota. State Welfare, Correctional, and Penal Institutions: Children, training school at Plankinton. Physically handicapped, School for the Deaf at Sioux Falls; School for the Blind at Gary; tuberculosis sanatorium, near Custer. Mentally handiapped; state hospital at Yankton; school for feebeminded at Redfield. Soldiers' Home at Hot Springs. Prison, Penitentiary at Sioux Falls.

Education. One-room schoolhouses sprang up in the South Dakota country almost as soon as the first permanent settlers arrived. Many early schoolhouses were constructed of logs and had dirt floors; in areas away from the streams, where logs were not available, sod

schoolhouses were common.

Today, South Dakota has a well-organized system of rural and city elementary and high schools, supervised by the state superintendent of public instruction, and by county superintendents and district boards of education. The excellence of the school system is demonstrated by the fact that South Dakota has one of the highest rates of literacy of any state in the Union. Many of the one-room schools now have been replaced by consolidated schools, but consolidation beyond a certain point has been difficult because of the sparseness of the population in many sections. School districts are required by state law to pay transportation allowances to families living more than four miles from the nearest school. Elementary education is compulsory for children seven to sixteen years of age. Vocational education in agriculture and home economics is stressed in many high schools.

Among the leading colleges and universities

South Dakota State College of Agriculture and Mechanic Arts at Brookings, opened in 1884. The college is the seat of the South Dakota State Experiment Station and the South Dakota Agriculture and Home Economics Extension Service. It supervises four agricultural experiment substations at Eureka, Vivian, Highmore, and Cottonwood. It offers regular four-year courses leading to the degree of Bachelor of Science in agriculture, engineering, home economics, pharmacy, and general science. The general science division offers work in applied science, printing and rural journalism, commercial

science, and music

University of South Dakota at Vermillion, was founded by the first territorial legislature in 1862 and first opened in 1882. The university consists of colleges of arts and sciences and fine arts; and schools of law, medicine, business administration, and education, and a graduate school. The state conducts work in geology, natural history, public health, and pure food and drugs.

Libraries. One of the oldest public libraries in South Dakota is the Carnegie Free Public Library of Sioux Falls, founded in 1879. It has notable collections on history, biography, art, Because of the scattered and Catholicism. population, it has been difficult to provide library service to farm families in many sections of the state. However, several county libraries have been established, and the South Dakota Free Library Commission, created in 1913, has a library at Pierre from which books are mailed to communities, to groups of citizens, and to individuals. There are more than one hundred library systems in the state. The best collection pertaining to South Dakota history is at the State Historical Library in Pierre. The Masonic Library in Sioux Falls contains comprehensive material about the Masonic order.

Arts and Crafts. Probably the earliest artists in the South Dakota country were the Sioux Indians, who decorated animal hides with porcupine quills and native dyes. White traders brought beads to barter for pelts, and the Sioux today are noted for their beautiful beadwork. The earliest painter in the region was George Catlin, who came by steamboat in 1832. Many of his paintings of Indian life are displayed in the Smithsonian Institution at Washington, D. C. Charles Bodmer, also a painter of Indians, visited the country soon after Catlin, and left

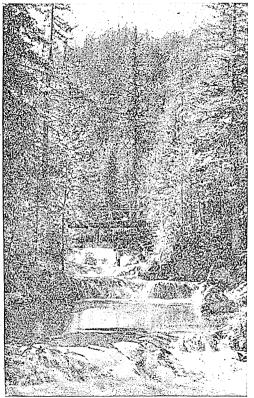
valuable pictorial records of the tribes.

Several writers have received inspiration for their work from personal experiences with the hardships of pioneer life in the Dakota country. O. E. Rölvaag wrote Giants in the Earth, a story of pioneer farmers in eastern South Dakota. Hamlin Garland, who lived for a time in the state, wove his experiences into Son of the Middle Border and Daughter of the Middle Border.

Religion. The earliest Christian religious activity in the region was that of venturesome Catholic and Protestant missionaries who came to teach the Indians during the early nineteenth century. Father De Smet, the most famous Catholic missionary to the Indians of the West, was one of these. The one most closely identified with Dakota history, however, was Stephen Riggs, a Protestant missionary who directed the translation of the Bible and of hymns into the Sioux language.

The many Scandinavian settlers brought the Lutheran faith, representing the largest religious denomination in the state today. The Catholics, however, approach in number the combined membership of the Lutheran churches. Other leading denominations, in order, are the Methodist, Congregational, Presbyterian, Baptist, Episcopal, Evangelical and Reformed, and Christian Reformed.

Social Welfare. Because of its rural and agricultural character, South Dakota does not have the problems of social welfare common to industrialized and densely populated areas. Mod-



SPEARFISH CANYON

The gorge of the Spearfish River is one of the most beautiful in the Black Hills. Trout and other game fish abound in the sparkling streams of this region.

ern forms of social security include a workmen's compensation law, a comprehensive publichealth program, and an advanced system for the care of the mentally and physically handicapped. The state was quick to meet the challenge of the Federal Social Security program. Accordingly, it has made adequate appropriations for support of dependent children, assistance to the aged, aid to the blind, and child welfare.

Recreation and Outdoors

South Dakota is unusually well provided with attractions for vacationists. Thousands annually visit the Black Hills, so named because

of their dark evergreen forests, and the Bad Lands, more than 150,000 acres of which have been set aside as a national monument (see MONUMENTS, NATIONAL). Wind Cave National Park also is a popular tourist attraction (see Parks, National). The many glacial lakes east of the Missouri River are centers for fishing, boating, swimming, and picnicking. Eastern South Dakota, too, offers some of the best pheasant hunting in the United States.

National Forests, containing winding mountain drives, lakes, clear streams, picnic grounds, and rare scenery, have been established in the Black Hills. The Harney and Black Hills national forests comprise more than one-half million acres each. Small forest areas in the northwestern part of the state are included in the Custer National Forest.

Other Interesting Places to Visit, which attract thousands of visitors to South Dakota annually, include:

Custer State Park (128,000 acres), one of the largest state parks in the United States. It contains the major scenic attractions of the Black Hills. The most important of these are: Mount Rushmore Memorial (which see), a "shrine of democracy" begun by Gutzon Borglum on the granite side of Rushmore Mountain in 1927. Iron Mountain Drive. On this scenic highway from Rushmore to the top of Iron Mountain are three rock tunnels that frame the faces on Mount Rushmore in the distance. The Needles, along the road to beautiful Sylvan Lake, great spirelike gray granite formations carved by erosion, in lovely groupings and settings.

Dells, along the Big Sioux River at Dell Rapids—a picturesque, rock-walled gorge.

Homestake Gold Mine at Lead. Largest gold mine in the world.

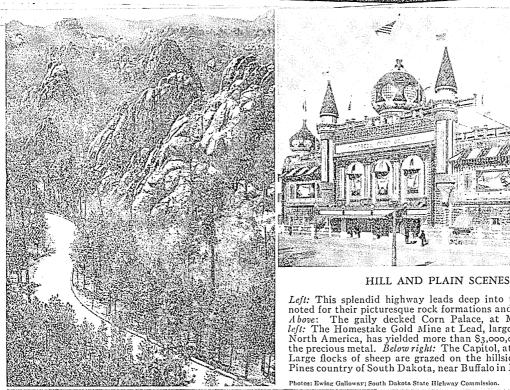
Hot Springs, in the southern Black Hills. Water from the warm mineral springs is used for medicinal purposes and for swimming pools. A Federal sanitarium for disabled soldiers is located here.

Pierre. Capitol, containing paintings of scenes in South Dakota history and of leaders in the development of the state. Soldiers' and Sailors' Memorial Hall, a World War I memorial, housing the State Museum, in which is preserved the lead plate buried by the Verendrye expedition in 1743; the Indian Museum, containing relics of Sitting Bull; and the State Historical Library.

Spearfish, at the northern edge of the Black Hills. Home of the Black Hills Passion Play, brought from Lünen, in Westphalia, Germany, in 1932 and estab-lished for its summer engagement in the Black Hills in 1937. The play is staged in a natural amphitheater in 1937. The play is staged in a natural amphitheater two or three times weekly. Most of the principal roles have been inherited, Josef Meier who portrays Christ, for instance, being the seventh of his name to play that part. The Lünen Passion Play is older than the famous Oberammergau one (see Passion Play), having been first presented by monks of the Cappenburg Monastery about the middle of the thirteenth century. Nearby is Spearfish Canyon, a mountain ravine cut deep into layers of limestone and sandstone, and noted for its beauty.

and noted for its beauty.

Stratosphere Bowl, near Rapid City. Scene of the first stratosphere flight in the United States, in July, 1934. In this flight, which was sponsored jointly by the United States Army Air Corps and the National Geographic Society, Major William E. Kepner, Captain Orvil A. Anderson, and Captain Albert W. Stevens reached an altitude of 60,613 feet in their giant balloon, Explorer I.



Left: This splendid highway leads deep into the Black Hills, noted for their picturesque rock formations and towering pines. Above: The gaily decked Corn Palace, at Mitchell. Below left: The Homestake Gold Mine at Lead, largest of its kind in North America, has yielded more than \$3,000,000,000 worth of the precious metal. Below right: The Capitol, at Pierre. Bottom: Large flocks of sheep are grazed on the hillsides of the Short Pines country of South Dakota, near Buffaloin Harding County.



Government

National: Electoral votes, 4 Representatives in Congress, 2.
State: Senators, 35; representatives, 75. Capital, Yankton, 1861-1883; Bismarck, N. D., 1883-1889; Pierre, since 1889.
Counties: 68.

South Dakota is governed under the constitution adopted in 1889, and amended many times by popular vote. The provision for amendment or revision by a constitutional convention has never been used. A majority of both houses of the legislature is required for the submission of an amendment, which becomes law only after approval by a majority of voters at the next general election. In 1898, South Dakota became the first state to adopt the initiative and referendum (which see).

Executive officers include a governor, lieutenant governor, secretary of state, auditor, treasurer, superintendent of public instruction, commissioner of school and public lands, and attorney general, each elected for two years. The superintendent of public instruction is elected on a nonpolitical ballot. Three railway commissioners are elected for six-year terms. In addition to these elected officials there are many appointed officials, boards, and commissions. Outstanding are a public utilities commission, free library commission, board of charities and corrections, board of regents, department of audits and accounts, department of finance, department of agriculture, department of history, and industrial commission.

Legislative functions are performed by a twohouse legislature, which opens sixty-day sessions in January of odd-numbered years. In most cases, representatives are elected from a district that comprises a county, and senators from a two-county district. The size of the legislature was materially reduced in 1937.

Judicial decisions are made by a series of courts, the highest of which is the supreme court, consisting of five judges elected on nonpartisan ballots for terms of six years. There are twelve circuit courts, with judges elected for four years. Each county has a county court which, in addition to other duties, has jurisdiction over juvenile cases. Cities of 5,000 or more population have municipal courts with functions similar to those of the county courts.

Local Government is administered with the county as a unit. Townships are organized in most of the eastern counties, but have very restricted governmental functions. Most of the cities have the mayor-council form of government, although some have adopted the citymanager and commission types (see CITY MANAGER; COMMISSION FORM OF GOVERN-MENT).

National Politics. Since 1900, South Dakota has voted Republican in national elections, except in 1912, when it favored Theodore Roosevelt's "Bull Moose" movement, and in 1932 and 1936, when it voted for Franklin D. Roosevelt. See Political Parties (chart).

Famous South Dakotans

Several persons, native to South Dakota or doing their most important work there, have achieved state, national, or international fame. They include:

Beadle, William H. H. (1838-1915), born in Parke County, Indiana. Father of the present-day permanent school fund in South Dakota. He came to Dakota Territory as surveyor general in 1869, and became territorial superintendent of public instruction in 1879, serving until 1885. He dedicated himself to the processing of the serving until 1885. self to the preservation of the school lands in Dakota, and succeeded in obtaining a constitutional provision that such lands could not be sold for less than ten dollars an acre. Through his influence, the first normal schools were founded in the state, and many THE TRANSPORT OF THE PROPERTY OF THE PROPERTY

public schools were established. Clark, Charles Badger (1883-), born at Albia, Ia. He gained nation-wide attention with his cowboy ballads, compiled in Sun and Saddle Leather and Grass Grown Trails. He also wrote a book of verse, Skyline and Wood Smoke, inspired by outdoor life in

the Black Hills, and several short stories.

Lawrence, Ernest Orlando (1901-), born at Canton. Inventor of the cyclotron, by means of which advanced research into the structure of the atom has been made. See Atom Smasher.

State Symbols and Events

State Seal. In the center is the Missouri River, with a steamboat representing fifty years of steamboat history. On the left are a range of hills and a smelter, symbolizing the mining industry; on the right are a herd of cattle and a field of corn, representing agriculture.

State Flag. See UNITED
STATES OF AMERICA (color plate, Flags of the States).
State Motto. Under God the people rule.
State Bird. Ring-necked pheasant. See BIRDS

(color plate, Game Birds).
State Flower. Pasqueflower. See Flowers (color plate, Prairie Flowers).

State Song. Popular but unofficial, "South Da-kota," by Willis E. Johnson.

Annual State Events. Among the interesting events on the state calendar are:

Farm Home Day at Brookings, in June (no fixed

Black Hills Passion Play at Spearfish, twice weekly from about the middle of June to the middle of September.

Gold Discovery Days at Custer, fourth week in July; commemorating the discovery of gold by the Custer expedition in 1874.

Black Hills Roundup at Belle Fourche, July 3-5;

Black Hills Roundup at Belle Fourche, July 3-5; a rodeo and Wild West celebration.
Days of '76 at Deadwood, first week in August; held in memory of gold-rush days.
State Fair at Huron, second week in September.
Corn Palace Festival at Mitchell, fourth week in September; a celebration held in a large auditorium decorated inside and out with ears of corn, showed a graces and grain and other form products.

sheaves of grass and grain, and other farm products.

Pioneer Day at Yankton, the territorial capital, in October (no fixed date).

History

- 1743 Francois and Louis-Joseph Verendrye buried a lead plate at a point near the site of Fort Pierre, claiming the region for France.

- 1785 Pierre Dorion, afterward guide for Lewis and Clark, began fur trade on the James River.

 1804 Lewis and Clark passed through the Dakota country, returning in 1806.

 1817 Fort Teton built near present site of Fort Pierre, beginning permanent settlement of Dakota.

 1831 Pierre Chouteau, Jr., brought first steamboat up the Missouri River to Fort Tecumsch (later Fort Pierre).
- 1857 First farm settlements made in the southeastern corner of what is now South Dakota.
- 1861 Dakota Territory created.
 1868 Red Cloud Indian War ended by Laramie Treaty;
 western part of state made part of great Sioux reservation.
 1872 First railroad built into South Dakota from Sioux City,

- Gold rush to the Black Hills began.
 South Dakota admitted to the Union.
 Battle of Wounded Knee, last armed conflict between
 Indians and white men in the United States.
- 1910 New Capitol dedicated at Pierre.
 1927 Mount Rushmore Memorial begun by Gutzon Borglum.
 1934 First stratosphere flight in the United States made near Rapid City.
 1941 Mineral and agricultural resources marshaled for war; several military installations established in the state.

Exploration and Early Settlement. The first white men known to have visited the South Dakota country were François and Louis-Joseph Verendrye, French explorers. In 1743, returning from an unsuccessful search for a route to the Pacific Ocean, they buried a lead plate near the site of Fort Pierre, claiming the region

In 1803, however, the territory was acquired by the United States as part of the Louisiana Purchase (which see). The open prairies then were mainly the home of the warlike Dakota, or Sioux, Indians.

The explorers, Lewis and Clark, crossed the region in 1804, returning in 1806. The Dakota country was prominent in fur-trading days because the Missouri River was the chief route between the beaver haunts of the high plains and the Rockies and the fur market at St. Louis, This period began before 1800 and lasted until 1855. The region was visited in 1811 by John Jacob Astor's land expedition to the mouth of the Columbia; in 1823 by a party under General William Ashley; in 1831 by Pierre Chouteau in a steamboat brought to Fort Pierre; and by many others connected with the fur business. By 1855, when the Federal Government bought Fort Pierre for a military post, the fur trade had ended.

The first permanent farming settlers came to the southeastern part of the territory in 1857, and founded several towns, including Yankton, Sioux Falls, Vermillion, and Elk Point. The Dakotas were part of the Missouri Territory until 1820, and the eastern section was successively included in the territories of Michigan, Wisconsin, Iowa, and Minnesota. From 1854 to 1861, the western part of the present states of North Dakota and South Dakota was included in Nebraska Territory.

Territorial Days. In 1861, the Territory of

Dakota was organized, including North Dakota, South Dakota, Montana, and part of Wyoming. The boundaries of the territory were reduced to include the present Dakotas in 1869. Development was stimulated by the Homestead Act of 1862, but it was hindered by the War between the States and by troubles with the Indians.

In 1875 a gold rush to the Black Hills was touched off by the report of the discovery of gold by General George Custer's military expedition to the region in the previous year. Out of the gold rush came the discovery of the great Homestake Lode at Lead. Deadwood, center of placer-mining operations, became a notorious "wide-open" mining town, the haunt of Wild Bill Hickok, Calamity Jane, Poker Alice, and other much-publicized characters of the "wild West."

Before the gold rush and afterward, the territory was disturbed by wars with the Sioux. The Red Cloud War was settled by the Laramie Treaty of 1868, reserving for the Sioux all the land between the Missouri River and the Big Horn Mountains of Wyoming. The gold rush brought a flood of prospectors and other white men into the Black Hills in violation of the treaty, and caused a series of uprisings led by the famous chiefs Spotted Tail, Red Cloud, and Sitting Bull. The last armed conflict between the red men and the whites took place at Wounded Knee in southern South Dakota in 1890, after Sitting Bull was killed.

Agitation was begun during the 1870's for the division of Dakota into two territories of equal size, and in 1883 the southern half became the first to frame a constitution. It applied for admission to the Union in 1885. În 1887, the proposition for the division of the territory into two states was approved by the voters. Two years later, the constitution of 1885, with slight changes, was adopted, and on November 2, 1889, South Dakota became a state, with North Dakota being admitted as a

"sister state" at the same time.

Progress as a State. The new state made progress despite grasshoppers, drought, hailstorms, and hot winds that damaged crops. The extension of the railroads into many parts of the state brought new settlers, and the coming of more settlers in turn stimulated the expansion of the railroads. Fields of wheat and corn increased in number east of the Missouri River, and cattle and sheep ranching began west of it. The mining settlements in the Black Hills increased in number, their growth rivaled by that of lumbering and the tourist trade.

In 1917 the state began a number of ventures in state socialism, nearly all of which were abandoned in later years. Among these were a system of rural credits, through which many millions of dollars were lent to farmers; a state guaranty of bank deposits; a state-owned coal mine and cement plant; and a state hail-insurance system.

In 1927 the Black Hills attracted national attention when President Calvin Coolidge established his summer White House there, and Gutzon Borglum started work on the Mount Rushmore Memorial. After Borglum's death, the memorial was completed by his son, Lincoln, in 1941. The first stratosphere flight in the United States was made in 1934 from the Stratosphere Bowl near Rapid City in the Black Hills, when the balloon Explorer I made an ascent of more than 60,000 feet.

World War II brought expansion of agricultural production, and of mica and feldspar mining in the Black Hills. Several military installations were established, including an army air forces technical school at Sioux Falls, an army flying school at Rapid City, and an ordnance depot at Provo.

Related Subjects. The reader is referred to the following articles in The World Book Encyclopedia:

CITY Pierre

Lewis and Clark Expedition Borglum, Gutzon Louisiana Purchase Miles, Nelson A. City Manager Commission Form of Mount Rushmore Memorial Government North Dakota (history) Pioneer Life Coolidge, Calvin Custer, George Armstrong Sitting Bull Homestead Acts Indians, American

LEADING PRODUCTS

Irrigation

Alfalfa	Gold	Poultry
Barley	Hog	Rye
Cattle	Jewelry	Sheep
Cement	Lithium	Silver
Corn	Lumber	Sorghum
Dairy Husbandry	Meat and Meat Packing	Wheat
Feldspar	Milk	Wool
Flax	Oats	

PHYSICAL FEATURES

Bad Lands Minnesota River Black Hills Missouri River

Books for Adults

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century.

Kohl, Edith Eudora. Land of the Burnt Thigh.

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Peterson, Purl Dewey. Through the Black Hills and Bad Lands of South Dakota. B. L. Hall, Pierre, S. Dak., 1929. Descriptive guide book.

Rölvaag, Ole Edvart. Giants in the Earth; a Saga of the Prairie. Blue Ribbon Books, 1937. Norwegian immigrants on a Dakota farm. Peder Victorious. Harper, 1928. A sequel to Giants in the Earth, depicting the conflict between the older conservative generation and the younger one. conservative generation and the younger one. Their Fathers' God. Harper, 1931. Concluding volume in Rölvaag's trilogy of Norwegian pioneers.

South Dakota Guide. South Dakota Guide Commission, 1938. (American Guide series.) Background and modern life.

WILDER, LAURA INGALLS. Little Town on the Prairie. Harper, 1941. Life in the Dakota Territory.

Books for Younger Readers

HUNKINS, RALPH VALENTINE, and LINDSEY, J. C. South Dakota; Its Past, Present, and Future. Macmillan, 1932. History and geography.

MCNEELY, MARIAN HURD. Jumping-off Place. Cadmus, 1940. Four orphans move to Dakota to take up acking.

to take up a claim. Rounds, Glen. Pay Dirt. Holiday, 1938. Sluicing

gold in the Black Hills.

SCHELL, HERBERT SAMUEL. South Dakota; Its Beginnings and Growth. American Book, 1942. History

American Book, 1942. History for young people.

ANDERPOL, JEANNETTE A., and McCain, L. P. Stories for Young Dakotans. Will A. Beach Printing Co., Sioux Falls, S. D., 1942. The stories of men and women who changed the lonely prairie into the South Dakota of today.

Questions on South Dakota

(An Outline suitable for South Dakota will be found with the article "State.")

Where in South Dakota is there a work of modern sculpture many times larger than the Sphinx of Egypt? Why is this sometimes called "the shrine of democracy"? What noted Indian fighter was responsible for the discovery of gold in South Dakota? In what

part of the state is located the largest gold mine in the world?

Near what South Dakota city was the first American flight into the stratosphere made? When? What height was achieved?

What religious drama, first presented long before the discovery of America, is now given at Spearfish?

Where in the state are some of the largest deposits of lithium in the world? For what else is this region noted?

What is the value to science of the Bad Lands of South Dakota?

How do the crops of South Dakota differ from

those produced in other prairie states?
Why is South Dakota called a state "full of distance"? How has this distance been con-

In what ways did the glaciers leave their mark upon eastern South Dakota? How does this region differ from the western part of the state in surface features? In climate? In the crops grown?

How does the position of the state, far from large bodies of water, affect the climate?
Why is it especially necessary for this state to conserve soil and water? What measures are taken

for this purpose?
Why is it that the western part of the state,

devoted almost solely to the grazing of livestock, is surpassed in cattle production by the eastern

Why are newspapers and radio especially im-

portant to South Dakotans?

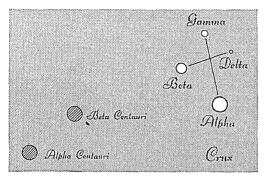
What significance have the following in the development of South Dakota: the Verendryes; Louisiana Purchase; John Jacob Astor; Pierre Chouteau; General George Custer; Deadwood; the Homestead Act of 1862; the gold rush of 1875; the Battle of Wounded Knee?

How did South Dakota contribute to the welfare of the United States during World War SOUTH EQUATORIAL CURRENT. See OCEAN (Ocean Currents).

SOUTHERN CALIFORNIA, UNIVERSITY OF. See California (Education).

SOUTHERN CHINESE REPUBLIC. See Sun Yat-Sen.

SOUTHERN CROSS, a famous constellation in the southern hemisphere, so called from the outline formed by its four brightest stars. The southernmost star is of the first magnitude, the eastern and northern stars of the second magnitude, and the western star of the third (see MAGNITUDE). The four stars are not arranged in the exact form of a cross, and to distinguish the constellation is somewhat difficult for those who are not familiar with it.



THE SOUTHERN CROSS

The upper and lower stars, forming the upright of the cross, are the pointers to the South Pole. This constellation is by no means as splendid as many constellations in the northern hemisphere, and is usually considered disappointing when first seen. The constellation, which moves counterclockwise, is also called Crux.

The star nearest the South Pole, called Alpha Crucis, is the brightest, and the most easterly star, named Beta Crucis, is the second brightest. Contrasted with the whiteness of Beta Crucis is a near-by eighth-magnitude star of such deep red color that it has been likened to a drop of blood. Alpha Crucis, a triple star at an estimated distance of 250 light-years from the earth, was supposed by astrologers to have an occult influence upon the observer. The Southern Cross was a well-known guidepost to early voyagers into the seas of the southern hemisphere. In the days of discovery, Brazil was called "the Land of the Holy Cross," and this constellation, has been represented on Brazilian postage stamps. Near the cross is a cloud of dark matter which early astronomers called the Coal Sack.

SOUTHERN MOSS. See AIR PLANTS. SOUTHERN UNIVERSITY AND AGRI-CULTURAL AND MECHANICAL COLLEGE, a state-controlled Negro school, founded in New Orleans in 1880 and moved to Scotlandville, La., in 1914.



Photo: Brown Bros

SOUTHEY, south' ih, ROBERT (1774-1843), an English poet and prose writer, associated with Wordsworth and Coleridge in the Lake School of English poetry (see Lake School). He was born at Bristol, but during most of his boyhood, he lived with an aunt at Bath, having at an early age lost both parents. He studied at Westminster School, from which he was expelled for writing a satire on flogging, and at Oxford, where he remained only two years. In 1794, with Coleridge and Lovell, he planned a socialistic colony, or "pantisocracy," to be founded in America, but the scheme was never

ROBERT SOUTHEY

founded in America, but the scheme was never carried out. In the following year, he married Edith Fricker, a sister of the lady who later became Coleridge's wife, and soon afterward went with his uncle to Portugal.

After his return to England, Southey established himself with his wife at Keswick, in the Lake District. Here he devoted himself to study and to the production of his numerous and varied writings, working always with great diligence. In 1807 the government granted him a pension of £160 a year, which was later increased to £300. The income from his books was also considerable. Early in his life, Southey had been a pronounced radical in politics, as in religion; as he grew older, he became more and more conservative, and in 1813, when he was appointed poet laureate, he was a stanch Tory. In 1837 his wife died, after a period of insanity, and two years later he married Caroline Bowles.

Southey is today ranked higher as a prose writer than as a poet. Indeed, in his own day, Byron, one of the sharpest critics of his poetry, said, "Southey's prose is perfect." Prose was his natural medium of expression, and he himself felt that he was scarcely justified in put-

ting his thoughts into verse, though some of his poems were popular.

His Poetry and Prose. Among his poems are Joan of Arc; Thalaba, the Destroyer; Madoc; The Curse of Kehama; and Roderick, the Last of the Goths, all narratives based on legends and myths. He also published Vision of Judgment, written in honor of George III. Some of his prose writings are a History of Brazil, a drama entitled Wat Tyler, the Letters from England by Don Manuel Alvarez Espriella, The Doctor, and biographies of Nelson, Wesley, and Bunyan. In The Doctor appeared an old folk tale—the story of The Three Bears.

SOUTH GEORGIA. See FALKLAND ISLANDS.

SOUTH GEORGIA AGRICULTURAL COL-LEGE. See GEORGIA (Education).

LEGE. See Georgia (Education).
SOUTH ISLAND. See New Zealand.

SOUTH MAGNETIC POLE. See MAGNET AND MAGNETISM.

SOUTH ORKNEYS. See FALKLAND ISLANDS.

SOUTH PLATTE RIVER. See COLORADO (Rivers and Lakes).

SOUTH POLAR EXPLORATION. See Polar Exploration.

SOUTH POLE. See Pole.

SOUTH SEA COMPANY. See WALPOLE, ROBERT.

SOUTH SEA ISLANDS, not a recognized geographical term, but a common name applied to the vast number of islands which dot the Pacific Ocean. See Pacific Islands.

SOUTH SHETLANDS. See Falkland Islands.

SOUTH VICTORIA LAND. See Antarctic Lands and Seas.

SOUTHWEST AFRICA, from 1884 to 1915 known as GERMAN SOUTHWEST AFRICA, lies

between Angola and the Union of South Africa, on the north and south, and between Bechuanaland and the Atlantic Ocean, on the east and west. The area of this former German colony —317,725 square miles, or more than twice the



LOCATION MAP

area of California—remained unchanged when it was transferred by mandate to the Union of South Africa after World War I. However, for administrative purposes, the region to the northeast, comprising 10,573 square miles and known as Caprivi Zipfel, was assigned to the Bechuanaland Protectorate, another British colony. The population in 1936 was 314,194, this number including 30,677 Europeans.

Among native races, the Hottentots and Bush men are important.

Germany began to take possession of this region in 1884. The boundaries of the colony were fixed by treaty with England and Portugal, in 1890. In 1903 a Hottentot tribe revolted, and the following year the powerful Herero nation rose in rebellion. This revolt was only subdued after three years of very stubborn fighting.

German Southwest Africa was conquered by British troops from the Union of South Africa in July, 1915, a little less than a year after the beginning of the World War. territory became officially Southwest Africa, sometimes referred to as the Southwest Africa Protectorate; and in 1920 it was placed under control of the Union of South Africa by mandate of the League of Nations. The laws of the Union, which may be modified to meet local conditions, have been introduced. The capital is Windhoek, centrally located and connected by rail with the coast at Walvis Bay; its population, including its surrounding district, is 14,371 (1936) natives, and 6,042 (1936) Euro-There is another railroad southward peans. into the Union of South Africa, and it also extends to the Atlantic, at Luderitz Bay.

Description and Resources. The coastal zone, extending inland about sixty miles, is sandy and barren, and is bordered by a wide belt of highlands, which rise gradually to an altitude of 3,000 to 6,000 feet. A small portion of the eastern section is a sandy desert, forming part of the great Kalahari Desert, but there are large areas of good grazing land.

The raising of sheep and cattle constitutes the chief source of wealth. Copper is mined, and since 1908 diamonds have been the chief export; they are found along the coast northward from Orange River. In 1929 large fields of nitrate of soda were discovered. Gold, lead, vanadium, silver, and other minerals have also been found. The other chief exports consist of wool, hides, horses, ivory, and ostrich feathers.

SOUTHWESTERN LOUISIANA INSTITUTE, a state school at Lafayette, La.

SOVEREIGN, sov' ur in, or suv' ur in, a current English gold coin, of the value of £1, and weighing 123.274 grains Troy. The sovereign is the standard monetary unit of Great Britain, its fineness being fixed at 916.66, or twenty-two carats. It was first issued by Henry VII in 1489; on its surface was stamped the figure of the king seated on the throne and dressed in his robes of state. At that time, the coin weighed 240 grains. When James I became king of the United Kingdom of England and Scotland, the sovereign was called a unite, to commemorate the union. Until 1816 Great Britain used both gold and silver as standards in its monetary system, but in

that year gold alone was made the standard

(see BIMETALLISM).

George III chose the sovereign for the unit of currency, and it was first issued in its present form in 1817. Half sovereigns were also coined at this time, and two-pound pieces were authorized. The standard weight of a sovereign is determined by that of 934½ sovereigns, whose weight is equal to twenty Troy pounds. The coin is made by alloying the gold with another metal, usually copper, in the proportion of eleven parts gold to one part alloy. The sovereign is equal to twenty English shillings, and when at par to about \$4.86 in the coin of the United States and Canada.

SOVEREIGNTY, the political condition of a state by which it has power to impose its will continuously, and without exception, upon all persons and matters within its jurisdiction.

The modern conception of sovereignty differs from that of the French king Louis XIV, who

said, "I am the State."

"Sovereign" as applied to a modern state signifies that that particular country possesses the right not only to form its own laws and conduct its own internal and external affairs, but also has the right to declare war without reference to or consent of any other state. The separate states of the American Union cannot properly be regarded as sovereign states, for, while possessing all of the attributes of sovereignty, so far as the conduct of their internal affairs is concerned, they are not absolutely independent as to external affairs affecting the whole of the United States. The sovereign power lies in the federation of states. The people are said to be sovereign in a democracy.

SOVIET, so' vih et, a word of Russian origin, meaning council, refers to groups of representatives of workmen, soldiers, and peasants formed throughout Russia after the czar was deposed in March, 1917. These soviets became increasingly influential, and in the fall of 1917 their representatives, meeting in congress at the capital, approved the Bolshevik revolution and the establishment of the Soviet government. By the constitutions of 1924 and 1936, Russia is called the Union of Soviet Socialist Republics. See Russia.

Related Subjects. The reader is referred to:
Lenin, Nikolai Russia Trotzky, Leon

SOW, the female hog (which see).

SOWING MACHINE, SEEDER, OR DRILL, a machine for planting seed, which opens the ground, deposits the seed, and covers it.

Corn requires a special type of planter; first, because of the size of the kernels, and second, because corn is usually planted in rows about three feet six inches apart, and the kernels are either dropped singly in the row spaced some six to eighteen inches apart, or else dropped in hills of two to four, three feet six inches apart. When dropped in hills, the machine is used

with a wire stretched across the field. This wire has on it knots or buttons spaced three feet six inches apart, and operates in such a way as to cause the hills to be dropped so that they are lined up crosswise, as well as the way the rows are being planted. This method permits cultivating up and down the rows and across them.

For small grains, the drill or seeder consists of a narrow chest or box six to fourteen feet long. The grain is fed out of the bottom of this box by means of specially designed feeding devices called seed cups. These devices are spaced six, seven, or eight inches apart. The fluted wheel consists of a corrugated wheel operating in a throat in the bottom of the box. As this corrugated wheel turns, it carries grain out in the flutes to the outside and drops it. The quantity per acre is regulated by sliding the flute into or out of the throat. The more of the fluted wheel that is in the throat, the heavier the seeding. An adjustable lip at the end of the throat adjusts the seed cup for different-sized grain.

The internal double run is called internal because the grain is carried on the inside of the rim of a wheel; and it is called double run because either side of the wheel may be used, and one side is larger than the other to accommodate larger seed. With this device, the rate of seeding is regulated by changing the speed of the seed cup with relation to the speed at which the drill is traveling over the ground.

This box, with the seed cups under it, is mounted on two wheels, one at each end. Steel or rubber tubes extend from the seed cups to the furrow-opening devices at the ground. The seed is delivered through the furrow-opening device into the furrow. The common types of furrow-openers are the single- and doubledisc openers, and the so-called hoe. The hoe type is but little more than a piece of pipe sawed off on the slant, with the pointed end to the front. The other two types throw the soil more than the hoe type, and therefore need some sort of a covering device for the grain. These types are therefore commonly equipped with a small wheel or chain. See AGRICULTURE. F.W.D.

SOW THISTLE, one of a genus of weeds belonging to the composite family. Though native to Europe, several species have been introduced into the United States, where they have become nuisances. The common sow thistle grows to be two or three feet tall, and has a branching stem, milky juice, and small yellow blossoms. In the north of Europe, the peasants use the tops and leaves of the plant as a potherb. The sow thistle can be eradicated only by careful cultivation and the planting of crops to check its growth.

Scientific Name. The botanical name of the common sow thistle is *Sonchus oleraceus*.

SOY. See RICE (Food Value).

SOYBEAN, a leguminous plant native to the Orient, where it has been a staple food for both men and animals for centuries. First grown in the United States as a forage crop, the soybean now furnishes a wide variety of products for industrial purposes as well as foods for the family table. It is richer in protein than beef, in calcium than milk, in lecithin than eggs, and is about as rich as any other food in such vital substances as vitamins, mineral salts, and acids. It contains only a trace of starch, is nonfattening, and easily digested. This "wonder" crop ranks in importance today with corn and wheat. In some form or another, it plays a vital part in the life of almost every person. In China, this "magic plant" and "wonder bean" is known as the "little honorable plant," and, in Russia, as the "little Soviet ally."

The soybean plant is used widely as hay, silage, and pasturage for stock feeding. The bean, however, is especially rich in proteins, fatty oils, mineral content, and vitamins. It has been the chief source of health and energy for the Orientals, who have lived on meatless and milkless diets for centuries. The food shortage brought on by World War II greatly increased the importance of the soybean, and brought it wide recognition as a food in the

Western world.

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In the manufacturing field, the soybean was found to be not only an excellent substitute for scarce materials but a better raw material in many instances.

Kinds and Varieties

Derived from a wild grass of eastern Asia, the soybean has branching foliage and grows two to three and one-half or more feet high. The stems, leaves, and pods are covered with short fine brown or gray hairs. Small white or purple flowers form in the angle where the leaf joins the stem. The pods usually contain from two to four seeds and range in color from very light yellow to shades of gray, brown, and black. The round or elliptical seeds are solid and variously colored, in shades of yellow, green, brown, and black.

More than 2,500 varieties or kinds of soybeans have been developed by introduction, selection, and crossing. Characteristics of both plant and bean vary with the soil, seasonal conditions, methods of cultivating, locality, and the source of the seed. The use for which the crop is being cultivated should determine the choice of kind to plant. The yellow-seeded types have a heavy oil content and are used for oil, oil meal, and flour. The forage varieties have smaller seeds, finer stems, are more leafy, and contain less oil. Some black, brown, and bicolored types can be used as green-shelled beans. They cook easily and have a mild, nutty flavor. The processing varieties have a strong flavor and are not suitable to be used raw.

Soil Best Suited. For the most part a hardy plant that will grow on nearly all types of soil, the soybean thrives best on mellow, fertile, or sandy loams. Good crops can be produced in drained swamplands, muck soils, and on soils of low fertility if lime, mineral elements, and inoculating organisms are provided.

Soybean Enemies. Although destructive soybean diseases are prevalent in the Orient, there has been relative freedom from such diseases in the United States. Some fungus, bacterial, and virus diseases exist. Grasshoppers, blister beetles, leaf hoppers, the green clover worm, and the velvetbean caterpillar are some of the insect enemies of the soybean plant.

Development of the Soybean

What is said to be the first record of the sovbean plant is found in a description of the plants of China written in 2838 B.C. by Emperor Shung Nung. One of the oldest crops grown by man, the soybean was considered the most important crop by the ancient Chinese, and one of the five sacred grains essential to their existence.

By the seventeenth century, soybeans were known to Europe and had been tried in Germany, England, France, and Hungary. However, the crop was not commercially established in any part of Europe until in recent years.

It was not until 1804 that the first mention of soybeans was made in American records. At that time James Mease wrote, "The soybean is adapted to Pennsylvania and should be cultivated." In 1854, the Perry expedition to Japan brought back two varieties, known then as "Japan pea," "Japan bean," and "Japan fodder plant." More varieties and seeds were obtained in 1889 and 1890. However, large-scale development of the crop in the United States dates from 1898, when the Department of Agriculture began introducing numerous varieties and types. Up to that time there probably were not more than eight varieties of soybeans grown in this country. Among soybean pioneers were Charles Vancouver Piper and W. J. Morse, both of the Department of Agriculture.

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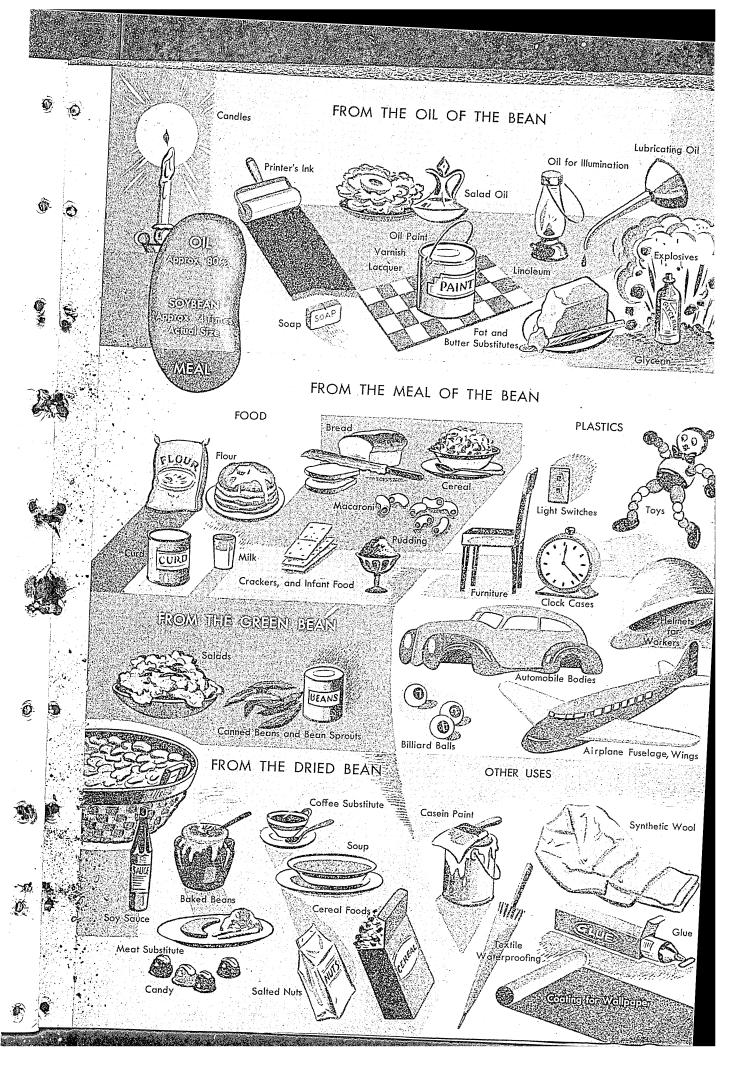
More than one hundred varieties of the soybean plant are now cultivated in the United States, and new types are continually being developed. The Middle West or corn states have

the highest acreage and yield.

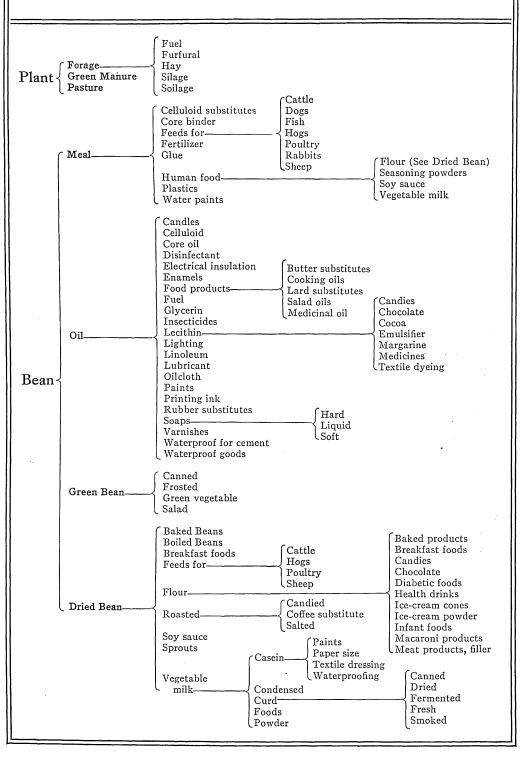
In other parts of the world the principal producing countries are Manchuria, which usually ranks first, Chosen, Japan, and the Netherlands Indies. However, the crop either has been tried or is now being grown for food, feed, or industrial uses in many other countries, including the Philippines, Thailand, Cochin-China, India, the East Indies, Russia, former Czechoslovakia, Rumania, Germany, England, South Africa, British East Africa, Algeria, Egypt, New South Wales, New Zealand, and Ontario. F. J. K.

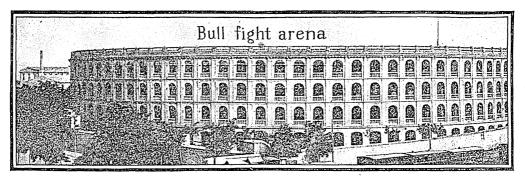
See also Bean.





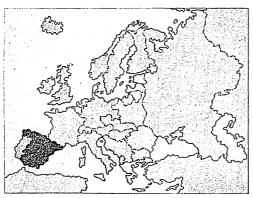
PRODUCTS AND BY-PRODUCTS OF THE SOYBEAN





SPAIN, a picturesque country of southwestern Europe, is rich in romantic traditions with a civilization that is a blending of ancient customs, medieval grandeur, and modern ideas. It was under the flag of Spain that Columbus discovered America, and Spanish navigators played an all-important part in the exploration and settlement of the New World. In the sixteenth century, this country was the most powerful nation in the world. Yet, of its numerous colonial possessions, which practically encircled the globe, none remain but small districts on the north and west coasts of Africa, and a few small islands in the Gulf of Guinea.

Size and Location. Having an area of 190,-050 square miles, continental Spain is about twice the size of the state of Oregon. Including the Canary and Balearic Islands, the area is 196,607 square miles. Spain occupies the greater part of the Iberian Peninsula. Its northwestern provinces border on the Atlantic, but the coun-



LOCATION MAP

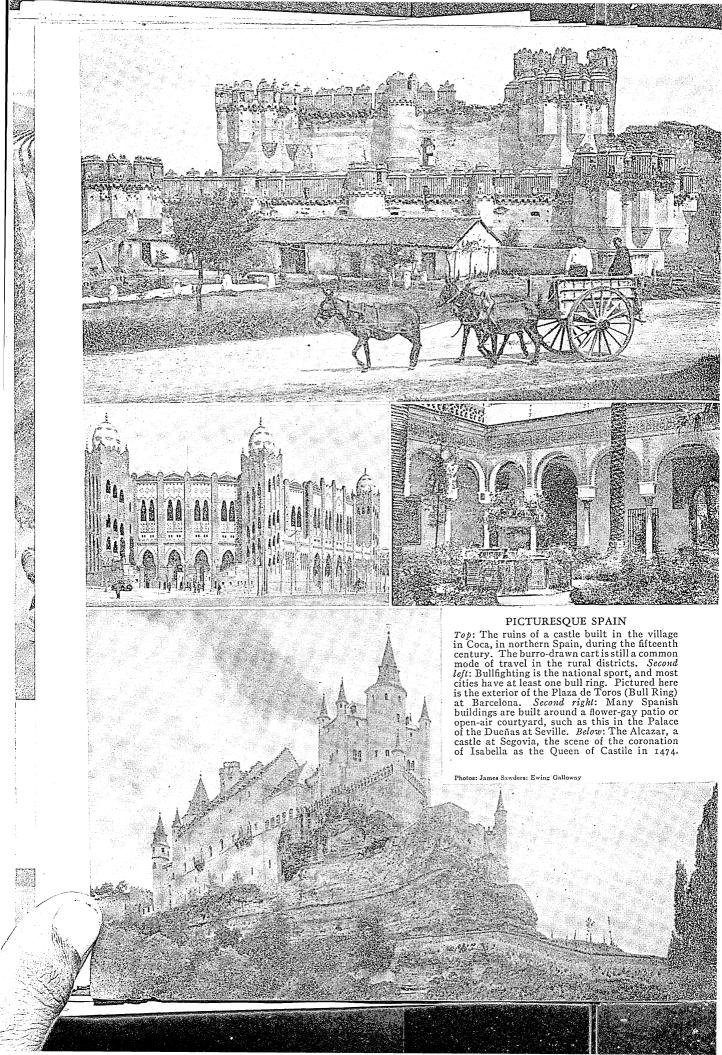
try is cut off from the ocean on the greater part of its western boundary by Portugal, and on the extreme south by the English fortress of Gibraltar, which is situated at the end of a long isthmus known as Neutral Ground. Spain's east coast forms the western boundary of the Mediterranean Sea, and on the north lies France.

The People and Their Customs. Southern Spain is a country of sunlit courtyards surrounded by picturesque balconies. Nearly every dwelling has barred or latticed windows. Not less picturesque than their cities are the buoyant, gayly dressed people themselves. In the south they are of medium height and of dark complexion, the women being especially noted for their beauty, dignity, and grace. The people of Northern Spain are usually blond, for they are of Celtic origin.

The Spanish are descended from the early Iberian inhabitants of the peninsula and the Celtic, Roman, Teutonic, and Moslem invaders. Jews also add to the composition of the race. Yet there is literally no "Spanish race," for the people of Spain are divided into rather well-defined groups with different languages and customs. The Basques of the North seem to be direct descendants of the ancient Iberians, and preserve distinct racial and linguistic characteristics. The Catalans of northeastern Spain, more French than Spanish in race and language, are intensely nationalistic. The remainder of the Spaniards are more or less racially related, with the Moorish strain more pronounced in the south, and the Celtic and Teutonic in the north. Population, 26,222,424 (1940).

Education. Spain's intellectual development has been slow, but an awakening interest in learning reduced the rate of illiteracy from 63.78 per cent in 1900 to 47.22 per cent in 1930. The republic built new public schools at the rate of 1,000 each year, and experimental schools made remarkable progress. Although compulsory education to the age of twelve was authorized in 1857, the law was badly enforced. Public schools are maintained by local taxation and are under governmental inspection. There is at least one high school in every province. The high schools give preparation for the eleven universities of Spain, located at Barcelona, Granada, Madrid, Murcia, Oviedo, Saragossa, Salamanca, Santiago, Seville, Valencia, and Valladolid. The Government also supports special schools, such as engineering, agriculture, music, and fine arts.

Religion. When the Republic was established in 1931, the ancient connection between Church and State was dissolved; religious freedom was proclaimed. The Franco dictatorship



largely cancelled measures to break the power of the clergy, such as rigorous regulations of religious orders; expulsion of the Jesuits and nationalization of their property; abolition of teaching orders; secularization of education; civil control of cemeteries; and easy divorce.

Language. The sonorous Spanish language is derived from the Latin. The Castilian dialect is the chief language of the country. The Catalan, which resembles Provençal, and the Gallego, more like the Portuguese, are spoken in the eastern and northern provinces.

Literature. The first known monuments of Spanish literature are the anonymous Poema del Cid (see CID, THE), and the Auto de los Reyes Magos, both dating probably from the twelfth century. The early epics found an echo in the numerous ballads or "romances" which followed them, chiefly recording the exploits of Charlemagne or the Cid. Juan Ruiz and Juan Manuel are famed early writers. In the Golden Age of Spanish literature (1550-1650) the writers included Calderón de la Barca and Lope de Vega (see Vega Carpio, Felix LOPE DE), poets and dramatists; and Cervantes, author of the masterpiece Don Quixote (which see). During this period, Spain invented the picaresque novel, named from its hero, a picaro, or rogue. Lazarillo de Tormes (1554) was the first of these.

The seventeenth century was a period of dramatic production, but in the next hundred years national literature declined. During the latter nineteenth century and early twentieth, such dramatists as Benavente, Echegaray, and Martinez Sierra restored the prestige of the drama. The novel, however, was the most prominent literary form, reaching great popularity with Vicente Blasco Ibánez (which see). Probably the finest work of the period was done by the novelist Perez Galdos (which see).

Art. Spain produced Velasquez, a painter who ranks with the greatest masters of the art; Murillo, who ranks also among the very great; and Zurbaran, El Greco, Goya, and Zuloaga, all of whom are also famous artists. See Painting (Seventeenth Century).

Principal Cities

Spain has a large rural population and comparatively few important towns.

Barcelona, bahr se lo' nah, is the most important commercial and industrial center of Spain, and has developed one of the few good harbors of the country. It is located on the northeastern coast of the Iberian Peninsula, commanding the Mediterranean. The old sections in the lower part of the city have narrow, crooked streets and remnants of ancient walls and fortifications which date back to the third or fourth century B.C., when Hamilcar Barca, the Carthaginian, founded the city, named it Barcino after himself, and established it as a Carthaginian stronghold.

On a hill in the center of the old town stands the cathedral of Barcelona, sixteenth-century, and one

of the finest examples of Spanish Gothic architecture. There is a fine public park at the north end of the city, containing several museums, most notable of which is the Museum of Reproductions. Barcelona is important as an educational center; the University of Barcelona was founded in 1430 and offers courses in practically every branch of learning.

Since about the twelfth century, Barcelona has been the leading city in Spain in commerce and industry. It has extensive cotton manufactures, other textile industries, principally those of wool and silk, and paper, glass, leather, and metal factories. During World War I, the city became very prosperous on the profits from the manufacture of war materials.

Barcelona was governed by its own count until the twelfth century, but was united with Aragon in 1151. In 1640, with the rest of Catalonia—of which it was formerly the capital—it placed itself under the French Crown, and twelve years later, it submitted again to the Spanish Government. In 1697 it was taken by the French, but was restored to Spain by the terms of the Peace of Utrecht, in 1714. During the Napoleonic Wars (1808-1814), Barcelona was occupied by the French, and since that period it has been a hotbed of republican ideas and revolutionary tendencies. (See Catalonia [History], below.) Population, 1,351,167 (1939 estimate).

Cádiz, ka' diz, one of the most important seaports of Spain, capital of the province of the same name, is located sixty miles northwest of Gibraltar on the Atlantic coast. It is believed to have been founded by the Phoenicians in II30 B.C., and to be the oldest town in Europe. It is well built, strongly fortified, well paved, and is very clean. Its snowy, whitewashed buildings apparently rise abruptly from the deeply blue water.

The chief buildings are the great hospital, the customhouse, the old and new cathedrals, the theaters, the bull ring, and the lighthouse of Saint Sebastian. The medical department of the University of Seville, a theological seminary, and commerce and art schools are located at Cádiz. The Bay of Cádiz has a good anchorage and is protected by the neighboring hills. It has four forts, two of which form the defense of the grand arsenal, at La Carraca, four miles from Cádiz.

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The Phoenicians of Tyre founded Cádiz in the early part of the twelfth century B.C., and called it Gadir, meaning fenced city. Wars with native tribes forced them to call on Carthage for help in about the sixth century B.C., and as a result, the city was annexed by the Carthaginians. The Romans possessed it next, and later the Moors. Alfonso X of Castile took it from the Saracens in 1262, and three centuries later, in 1596, the English occupied the town. Trade with the Spanish colonies in the eighteenth century brought the city many riches, but this waned with subsequent attacks by the French, and the general decline of Spanish commercial importance.

Cádiz has long been the principal Spanish naval station. The exports are mainly wine and fruit. Population, 75,393 (1935 estimate).

Córdoba, formerly Cordova, an ancient Moorish city, important during the Middle Ages. It is situated on the banks of the Guadalquivir, eighty-six miles northeast of Seville. The old city streets are narrow, crooked, and in many parts dirty, but there is a more modern portion which shows little trace of the Moorish occupation. The cathedral is the most remarkable structure in the city. Like most Spanish cities, Córdoba was onçe a great commercial center.

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Population, at the height of its old splendor, estimated at over 1,000,000; now 137,145 (1939 estimate).

Granada, an old Moorish city more noted for its past glories than its modern attainments. It is in Southeastern Spain, forty miles inland from the Mediterranean, in the foothills of the Sierra Nevada range, at an altitude of 2,195 feet above sea level. It has narrow, crooked streets and a conglomeration of architecture chiefly reflecting the Oriental influence of the Saracens, who made this city their capital and center of wealth and learning. The types of buildings range from the none-too-clean hovels of the poorer classes to the beautiful Alhambra palace, and here and there are Moslem churches which have been remodeled for Christian worship.

The picturesqueness of the city cannot be denied; one seems in a different world and transplanted to another age. The gay costumes of the inhabitants, the occasional glimpse of a gypsy, the ever-present ruins, all of which might tell us an interesting and probably romantic tale, and the apparent apathy of the people, who leisurely enjoy the delightful climate with little evidence of ambition and no undue energy, constitute the ensemble which makes up Granada, and inspires even the owners of sordid cafés of Western cities to name their resorts for this dilapidated yet romantic Moorish city.

The city has many sections and suburbs; the Darro River sets off some of the suburbs from the modern part, which lies to the north. Gardens, promenades, and fountains of the Moorish days have been preserved. Near the colorful Alhambra, a little to the north of the city, is another Moorish palace, the Generalife, a summer home for the Moslem princes. There are many educational and charitable institutions, and the university was founded four hundred years ago. The cathedral, which was under construction from 1529 to 1703, is symbolic of the Christian supremacy over the Saracen, and occupies the very ground of the principal Moorish mosque. In the Royal Chapel of this cathedral are the tombs of Ferdinand and Isabella, who conquered the independent province of Granada in 1492, after a ten years' struggle, and drove the Moors from their last European stronghold.

The city, founded by the Moors in the eighth century, reached the height of its power in the thirteenth century. During this period, its population was over 400,000, but after the surrender to Spanish rule, slow decay began. What few manufactures there are consist of textiles, paper, leather, macaroni, and chocolate, and some trade is carried on with the surrounding towns. The Madrid, Granada & Algeciras Railway provides transportation facilities. Population, 132,427 (1939 estimate). Madrid, mah drid', the capital city, situated on a

Madrid, mah drid', the capital city, situated on a high plateau, 2,150 feet above the sea, lies almost equidistant from the Mediterranean, the Atlantic, and the Bay of Biscay; it is about 1,330 miles west of Rome. The climate, owing to the altitude and general location, is subject to disagreeable extremes of heat and cold. Although in the tenth century it was a fortified post on the frontier of the Moorish kingdom of Toledo, Madrid is very modern, with but few medieval landmarks. But the scars of the civil war are apparent, for many of Madrid's fine buildings, monuments, and suburbs were destroyed.

The Puerta del Sol, an imposing public square, is located in the center of the business district, and from it all the principal streets branch, like the spokes in a wheel. To the east lies one of the most beautiful

boulevards in the world, the Prado, lined with stately trees and made interesting by fountains, memorials, and statues. To the west is the National Palace, a magnificent granite building planned by Philip V. and containing many costly paintings, statues, and decorations; it is surrounded by vast grounds and gardens. Another impressive structure is the National Library and Museum, which was completed in 1892 and ranks with the best in the world. The Royal Armory, with its famous collection of rare arms-a reminder of the former glories of Spain; the National Museum of Painting and Sculpture, containing masterpieces of Velasquez, Murillo, Raphael, Rubens, and Van Dyck; and the Marine Library and a number of others make Madrid a cultural center of particular interest to the traveler and scholar. The University of Madrid is one of the largest of Europe, with faculties of the arts, music, engineering, commerce, education, and science.

Madrid has an opera house, one of the most beautiful in Europe. The bull ring, the Plaza de Toros, is of Moorish architectural design and has a seating capacity of 13,000. The public utilities of the city are progressing with the population, new reservoirs have been constructed to supply the additional demands for water, and in 1924 the first underground railroad in Spain was completed. In 1925, \$425,000 was appropriated by the Rockefeller Foundation for a school of chemistry and physics. A new cathedral was built on the site of the old church in the Calle de Bailen, and an Anglican church was erected. Many other new and modern buildings, which have been recently added, give Madrid a twentieth century air.

It is the railroad and distributing center of Spain, and though, until recently, manufactures have been of little consequence, rapid development is taking place. There is a national tobacco factory, besides manufactories of jewelry, leather, fans, umbrellas, chemicals, and liquors. The publishing trade is important; the old tapestry factory still does beautiful work, and the potteries at Moncloa are producing clever imitations of the earthenware for which Spain wasoncefamed. Population, 1,166,603 (1939 estimate).

Málaga, mah' lah gah, one of the most important seaports, is situated in the extreme south of the country, on the Mediterranean Sea, sixty-five miles northeast of Gibraltar. A Moorish castle, built in the thirteenth century, and similar Moorish landmarks in the older parts of the town, stand out in marked contrast to the imposing modern structures in the new quarters.

Because of its mild and uniform climate, Málaga has become famous as a resort for invalids. The Alameda, a beautiful boulevard, and other attractive residential districts have been laid out near the shore line. Though the city's trade has shown a decline in recent years, due to unscientific methods of agriculture and insufficient means of communication, olives, olive oil, wine, raisins, lead, almonds, lemons, grapes, and esparto grass are exported annually in large quantities. Manufacturing has been given renewed impetus, and there are thriving establishments for making cotton and linen goods, atistic pottery soap, chemicals, iron products, sugar, etc. Population, 227,041 (1939 estimate).

Murcia, mur' shih ah, a city in Southeastern Spain, lies in the midst of one of the most fertile and beautiful valleys of the country, on both banks of the Segura River, twenty-five miles west of the Mediterranean Sea. Promenades and pleasure gardens

Ancient and Modern Aspects. At left, a peasant of to-day in his home in Valencia. At right, an old aqueduct still standing at Segovia, built centuries ago, during Roman occupation of the country.

stretching along the river banks, the luxuriant vineyards and mulberry, fig, and olive groves of the fruitful valley, lend charm and interest to the city. Murcia has been successively under the control of the Romans, Moors, and Spaniards, and one may still see traces of its former days in a few narrow streets with their quaint balconied houses. The most interesting feature of the place is the great cathedral, in Gothic-Romanesque style, begun in the fourteenth century. Although there is a thriving trade in grain and fruit, silk-making is the most important industry Population, 175,344 (1939 estimate).

Saragossa, sair a gos' ah, or Zaragoza, thah' rahgo' thah, a prosperous commercial city in the northeastern part of the kingdom, situated on the right bank of the Ebro River, 212 miles northeast of Madrid, on the site of an ancient town of the Iberians. The name of the present city comes from Caesarea Augusta, which the Emperor Augustus applied to the settlement in 25 B.C., when he made it a Roman colony. It was once the capital of the old kingdom of Aragon (see CASTILE AND ARAGON).

In respect to appearance, Saragossa is said to be the oldest and the newest Spanish city, for around the central portion, with its crooked lanes and dilapidated houses, has been built a modern section with fine, broad avenues and handsome homes and buildings. The city is important as a railroad center and as a center of trade for a fertile farming region. Population, 207,545 (1939 estimate).

Seville, se vil', or Sevilla, sa veel' yah, famed in poetry and song, is situated on the Guadalquivir River, about sixty miles northeast of Cadiz, in the midst of a country of sunny vineyards and orange and olive groves. It is variously called "The White City on the Guadalquivir" and "Queen of Andalusia." It has an added fame in being the birthplace of Spain's two greatest masters of painting—Velasquez and Murillo.

For many centuries, Seville was the home of the Moors, and its architecture now presents a curious mingling of Moorish and Christian forms. In recent years, it has lost much of its picturesque Moorish atmosphere, apparent in the network of small, shaded streets, the quaint, balconied houses built around handsome courtyards and gardens, and the fine squares studded with fountains; for Seville has been enlarged and beautified in a modern sense.

Only a few remains are now visible of the wall of sixty-four towers, which once encircled the city. The greatest ornament of Seville is its cathedral, third largest in Europe, built in 1402-1519 on the site of a Moorish mosque. Near by are the Court of Oranges and beautiful Campanile, or bell tower, called Giralda, with its twenty-two sweet-toned bells. Another of the glories of Seville is the Alcazar, an ancient palace of Moorish kings. The bull ring has seating space for 12,000 people.

Although the city no longer lays claim to the title of "Spanish Athens," which it once so proudly bore, it is still an intellectual center. Next to Madrid it is the most flourishing city in art, literature, and university education in Spain. It is rapidly recovering much of the commercial prosperity which it enjoyed in the seventeenth century, when it was the chief mart of Spanish commerce, and has built up an extensive industry in the manufacture of cigars, pottery, silks, machinery, chocolate, perfume, iron products, and other commodities. Population, 250,501 (1939 estimate).

Valencia, va len' shill ah, the third city in population, ranking next to Madrid and Barcelona. It lies on the River Guadalquivir, in the midst of a fertile plain, three miles from the Mediterranean coast. Its ancient walls, originally built by the Romans, were torn down in 1871, and have been replaced by handsome boulevards; two gateways with picturesque towers are all that remain of the old fortifications.

The city is a mixture of Oriental civilization and that of the present age. There are rows of white dwelling houses in the Moorish style of architecture, and innumerable domes and towers roofed with gold, blue, and white tiles; many of the crooked, narrow streets have been replaced by broad avenues, and all modern sanitary improvements have been acquired. The city has many interesting structures dating from the thirteenth century to modern times. The university is now one of the foremost in Spain, and the municipal botanical gardens, outside the line of the old walls, are unsurpassed anywhere else in the The leading manufacturing enterprise of country. Valencia is the silk industry, but the place is noted also for the production of colored tiles, tobacco, textiles, and iron and bronze wares. It is an important railway center, and carries on a thriving export trade in oranges and other fruits. Population, 399,061 (1939 estimate).

Valladolid, vahl yah tho leeth', an interesting old city, situated on the Pisuerga River, 102 miles northwest of Madrid. This city possesses historic and literary interest, for Columbus died there, and there Philip II was born; and from 1603 to 1606, it was the home of Cervantes, famous as the author of Dan Owizale.

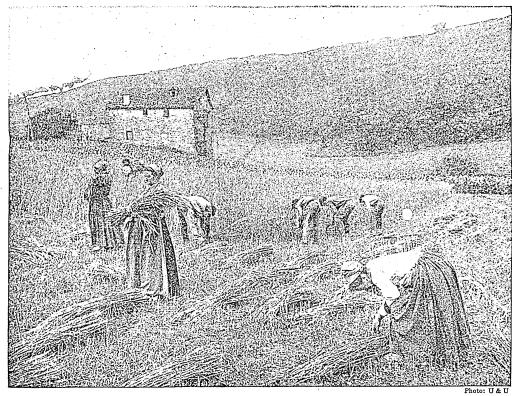
Valladolid has many attractive plazas, parks, arcades, cathedrals, and other structures, rich in ornamentation and picturesque courts and façades. Its thirteenth-century Church of San Pablo and the building containing the city offices rank among the world's finest examples of Gothic architecture. Its educational institutions include one of the oldest universities in Europe. The city was the capital of Castile and Leon during the latter part of the Middle Ages, and after the union of Castile and Aragon, it was the capital of Spain until superseded by Madrid, in 1560. Population, 105,318 (1939 estimate).

The Country and Its Industries

The Land. Spain is a country of contrasts, not only between the old and new civilizations, but in its natural features as well. It is a country of boundless plains and rugged sierras, of barren mountains and fertile valleys, of trackless and silent wastes and flourishing gardens, of the vine, olive, and orange. In the northwest provinces, bordering the Atlantic and the Bay of Biscay, there are fertile mead-

ows and fields of flowers, and dense forests of oak, beech, and chestnut. In the south there are rich sections of luxuriant tropical vegetation, but barren steppes, studded with a few fertile oases, border the southeastern coast.

Three-fourths of the peninsula is a treeless table-land 1,000 to 3,000 feet above the sea, enclosed by high mountains and broken by rough sierras. On the north, Spain is separated from



HARD, BACK-BREAKING FARM LABOR

In the provinces of Northern Spain are regions of forests, farms, and scattered villages. The people there seldom travel, and only a very few read newspapers, for illiteracy is very widespread. Farm work is still done by hand; a reaping machine would be looked upon as a miraculous contrivance.

France by the Pyrenees, the highest summit of which is the Pico de Aneto (11,160 feet). Near the southern coast rise the lofty Sierra Nevada Mountains, whose culminating peak, Mulhacén (11,664 feet), is the highest in Spain and one of the loftiest in Europe.

The Atlantic coast is steep and rocky, and in its many fiordlike indentations are good harbors. The south and east coasts, however, are comparatively regular, the gentle curves projecting in a few prominent headlands. At Gibraltar the coast rises to precipitous rocky cliffs.

Rivers and Lakes. Four of the great rivers of Spain rise in the central table-land and empty into the Atlantic. The Tagus and the Douro flow west through Portugal; the Guadiana follows a southerly course along the Portuguese houndary; the Guadalquivir, the deepest, flows south through the olive-clad region of Andalusia, and is navigable for large vessels; the Ebro rises in the Cantabrian Mountains and flows east to the Mediterranean. It is the only navigable stream on the Mediterranean side.

There are numerous small mountain lakes, and in the barren steppes are many salt ponds, but the only bodies of water of any size are three coast lagoons, the Albufera near Valencia, the Mar Menor of Murcia, and the Laguna de la Janda in Cadiz.

Climate. Every climate of the temperate zone is to be found in Spain. As great extremes of temperature as occur in any part of Europe are experienced in the central tableland. In this region the summers are very warm and almost rainless; however, nights are very cool, and sudden changes of temperature are frequent in all seasons.

In Andalusia, or South Spain, there is a subtropical climate. During the mild winter, vegetation is most luxuriant. The dry steppes and plains of the southeast coast are the warmest sections of the country, and are frequently swept by the "solano," a withering and scorching wind which sometimes blows for two weeks. The northwest provinces on the Atlantic seaboard have a climate equable and moist as that on the western coasts of England and Scotland.

Agriculture. A large proportion of the inhabitants are engaged in farming, but methods of cultivation are generally crude. Although over ninety per cent of the land of Spain is productive, nearly one-third of the country

remains uncultivated. Following the World War, agriculture was encouraged by the creation of commissions and schools, the inauguration of large irrigation projects, and the introduction of new machinery and better methods of cultivation. Many large estates, formerly rented at high rates, were divided and sold to farmers with small capital. The policy of the Republic was to create tenant farmers under the state. Lands partly confiscated from ecclesiastical and aristocratic holdings were distributed. The Franco reaction terminated the reform.

Irrigation is necessary in the central and eastern districts and in parts of the northwestern provinces. The two most productive regions are in Valencia and Catalonia, where the land is carefully terraced, fertilized, and irrigated by a network of canals fed from reservoirs. Here, all of the available land is tilled, and large crops of oranges, lemons, grapes, and other fruits are produced. Rice is grown extensively in the swamps in Valencia. In the northwest provinces, the land is naturally more fertile and the rain more plentiful. In this section, European fruits are cultivated, and the cultivation of cereals, diversified farming, and stock-raising are important. In the valleys' of Andalusia, olives, almonds, figs, pineapples, bananas, the date palm, and some sugar cane

are grown. The most important crops of the country are wheat, barley, rye, oats, grapes, and olives. Vines are grown in every province, and large quantities of wines, especially the famous Malaga and Alicante, and the sherry and tinto wines from Jerez de la Frontera, as well as grapes and raisins, are exported. The olive groves embrace hundreds of square miles, and from the cities of Seville and Cordova, Spanish olives and olive oil are sent to all parts of the world. The silkworm is extensively cultivated, especially in the south. Spain is noted for its fine horses and mules and its Merino sheep. Large flocks of goats, whose flesh and milk are favorite foods, are raised throughout the country.

Forests. The table-land and mountains of Central Spain are scantily supplied with trees, and in many sections the lack of timber is severely felt. The finest forests are in the West Pyrenees and Cantabrian mountains, and the most valuable trees are the cork oak and Spanish chestnut. Cork forests are also abundant in the southern mountains. Spain's output of cork exceeds that of any other country in the world; Portugal and Spain together produce almost three-fourths of the world's supply.

Minerals. Though the vast mineral resources of Spain are in an early stage of development, no other country of Europe produces as much copper, lead, and mercury. A large part of the mining has been done with foreign capital, but perhaps in the future, Spanish enterprise may take advantage of this great natural wealth. Lead-ore, copper, and coal mines are scattered throughout the coun-The famous mercury mines of Almaden were the richest in the world until the discovery of mercury in California. These and the salt works are the only mining industries owned by the government. Zinc, pyrites, manganese, cobalt, sulphate of soda, sulphur, and phosphorus are also found, and in 1915 deposits of platinum were reported.

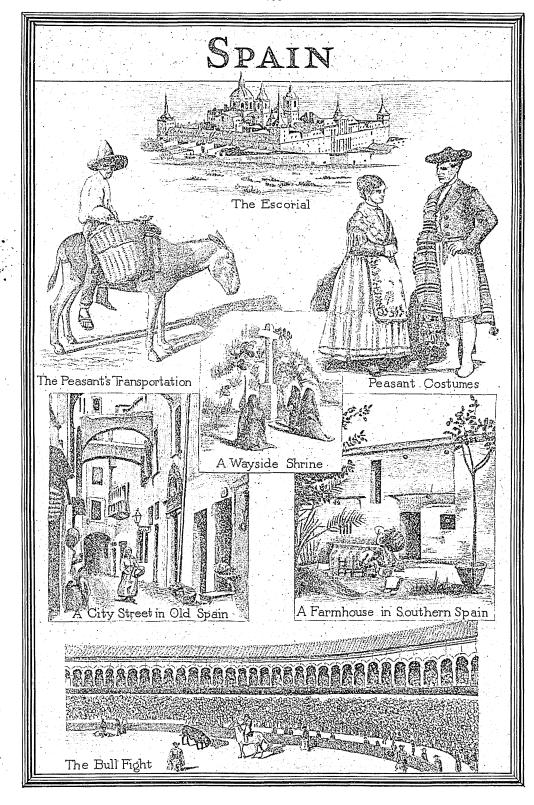
Manufactures. The northern provinces, being nearer to the commercial centers of Europe, have the largest manufacturing industries. The chief manufactures—cotton goods, woolens. and laces—are centered in Barcelona. Linen and paper mills are also numerous in the northern provinces. The weaving of silk is growing in importance in the south, and there are a number of glassmaking factories. The manufacture of sugar is on the increase, and a few new iron and steel plants have been set up. Seville produces the greatest amount of cork products, but those of superior quality are manufactured at Barcelona. Although the protected market and the recent use of electricity and the water power of the mountain streams have increased manufactures, Spain's production falls far short of its needs and possibilities.

Transportation and Commerce. Spain is reached by Western tourists by way of Cadiz, or through the passes of the Pyrenees from France. There are over 10,000 miles of railroad, all owned by private companies. The gauge differs from that of the French line, making it necessary to change trains when the frontier is reached. In the larger cities, electric and motor cars make their way among the mule carts and ox teams, which are still the most common "carryall" in Spain. The roads have been greatly improved, more than 7,000 miles having been paved with concrete. Barcelona and Madrid have subway systems for rapid transit. There are commercial airlines between Madrid, Seville, and Lisbon; Toulouse, France, Casablanca, Morocco, and Alicante; Madrid and Barcelona.

Although Spain has twenty-one seaboard provinces bordering the Atlantic and the Mediterranean, the country is not important among the commercial nations of Europe. However, in recent years the merchant marine has been increased, and foreign trade is being revived. Much of the trade is with Great Britain, France, the United States, Germany, Argentina, and Cuba. Trade is protected by high duties,

and since 1894 the United Kingdom has been the "most favored nation." The principal exports are wine, over 3,000,000 gallons of which go yearly to Great Britain alone; cork,

metals, olives and other fruits, sugar, timber,



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animals, glassware, pottery, wool, and cotton goods. Foodstuffs, livestock, machinery, coal,

raw cotton and linen, motor vehicles, and drugs and chemicals are imported.

Government and History of Spain

Government. The monarchy was ruled under the Constitution of 1876, which vested great executive power in the king, and a restricted legislative authority in a Cortes (parliament) which consisted of a Senate and a Chamber of Deputies. The Cortes was dissolved on September 16, 1923, by order of the King, and was not convened again during the reign of Alfonso XIII. In 1923, Primo de Rivera, Captain General of Catalonia, declared himself dictator. The King acquiesced in this and gave Rivera full control. In 1925 the military dictatorship gave place to civil government with Rivera still in control. He was succeeded in 1930 by General Damasco Berenguer, who served but a year and in turn was himself succeeded in 1931 by Admiral Juan Aznar

Following the elections of April 12, 1931, the monarchy was overthrown, and two days later Alfonso fled into exile. Prime Minister Niceto Alcala Zamora y Torres at once proclaimed a republic. Zamora was made provisional president. Far-reaching reforms were inaugurated, titles of nobility were abolished, and the King's property was confiscated. The Cortes, assembled on July 14, began the work of making a new constitution, which was accepted in December. It provided for a president, elected for six years, and a Cortes of one house, the members to be elected by universal suffrage for four years. Church and state were separated, education was made entirely secular, and provision was made for the division of the large estates among the peasants. The constitution was based on the fundamental principle that "Spain is a democratic republic of workers of all classes." In many respects it was highly socialistic. This progressive constitution expired in 1939 when Spain fell to the Rebels after thirty-two months of civil war, which cost the lives of an estimated 5 per cent of the population. For an account of the events of the civil war, see *History*, below.

Following the outbreak of civil war, the insurgents on July 30, 1936, set up a government at Burgos under the name of Junta de Defensa Nacional with General Francisco Franco at the head. On October 1, 1936, the insurgents set up a Gobierno del Estado Espanol with Franco as its chief (Jefe del Gobierno). The organic law of this government was totalitarian, with Franco as the dictator. On February 1, 1938, a new civil government was organized along authoritarian lines, with General Franco as virtual dictator, assisted by a cabinet of eleven members, resembling the Fascist Grand Council of Italy. It is not to be expected, however,

that Fascism in Spain will adhere to any set model. It will instead be modified as seems necessary in order to fit Spanish conditions and temperament.

Colonies. Of its once extensive colonial possessions, Spain now retains only Adrar and Rio de Oro, on the Sahara coast; Spanish Guinea and Ifni, also on the west coast of Africa; and the islands of Fernando Po, Annobon, and Corisco and the Elobey Islands, all in the Gulf of Guinea. The total area of these possessions, including Spanish Morocco, over which Spain has a protectorate, is 128,696 square miles; the population is about 800,000. The Canary and Balearic islands are considered a part of Spain, and are under the central government. The colonial government of Spanish Guinea and of the islands in the Gulf of Guinea is centered at Fernando Po. Rio de Oro and Adrar are under the government of the Canary Islands. Of the foregoing colonies, several are treated as separate articles in these volumes. See Africa (map, page 77; Division into Countries); Balearic Isles; Canary Islands; GUINEA; MOROCCO; RIO DE ORO.

The Three Conquests of Spain. This ancient country, known to the Greeks and Romans as Hispania or Iberia, and inhabited by people they called Celtiberians, was colonized in the twelfth century before Christ by the Phoenicians. The first real conquest of the peninsula was made by the Romans when, in the Second Punic War, they defeated the Carthaginians and made Spain a Roman province. It was with difficulty that the Romans held their supremacy over the native tribes, and it was necessary for them to keep large armed forces in Spain. However, it became one of the most flourishing provinces of the empire and a center of Roman culture, producing many of Rome's greatest writers, including Seneca, Martial, and Quintilian. During the reign of Constantine the Great, Christianity became the dominant religion. See Constantine, Gaius FLAVIUS VALERIUS CONSTANTINUS; ROME (The Decline of the Empire).

With the fall of the Roman Empire, Spain fell under the power of the three Gothic tribes: the Vandals conquered the south, naming it Vandalusia (now Andalusia), and the Suevi and Alans settled in Galicia and Portugal. By 573 the Visigoths had subjected these invaders and had conquered the whole peninsula. After a mastery of nearly two hundred years, they in turn were subjugated by the Moors in 711-712. The language and customs of the Arabs were introduced. Gorgeous palaces and fortresses, such as the Alhambra at Granada, and

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See How To READ A MAP, opposite page r, Volume A

SPAIN AND PORTUGAL

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PORTUGAL	Azuagua, 17,467	Hinojosa, 14,085	Pontevedra (prov.),
Aveiro, 12,735 B 2	Radaioz 44 883 C. 3	Hospitalet, 33,567	574,950
Aveiro (district), 381,694 B 2	Badajoz (prov.), 714,024, C. 3	Huelva, 46,982	Pueblonuevo, 24,691 D 3
Beja, 12,985 B 4	Badalona, 42,230	Huelva (prov.), 359,892 C 4	Puente-Genil, 23,508 D 4
Beja (district), 240,465 B 4	Baena, 21,289 D 4	Huesca, 15,917F 1 Huesca (prov.), 241,450G 1	Puerto de Santa María,
Braga, 26,962 B 2	Baeza, 16,372 E 4	Huesca (prov.), 241,450 G 1	El, 19,847 C 4
Braga (district), 414,784, B 2	Balearic Is. (Islas Bale-	Ibiza (island), 30,139 G 3	Puertollano, 19,487 D 3 Puerto Real, 11,096 D 4
Braganca 6.089 C. 2	ares, prov.), 370,853H 3	Igualada, 13,438	Puerto Real, 11,096 D 4
Bragança (district),	Baracaldo, 34,009E 1	Inca, 10,547	Redondela, 16,024
185,164	Barcelona, 1,041,865 H 2	Irún, 17,505 F 1	Reinosa, 8,686 E 1
Castelo Branco, 9,820C 3	Barcelona (prov.),	Islas Balcares (Balcaric	Requena, 17,754 F 3
Castelo Branco (district).	1,892,039	Is., prov.), 370,853H 3	Reus, 30,186
265,573	Baza, 17,506 E 4	Jaén, 41,065 E 4	Ribeira, 18,835 B 1
Coimbra, 27,333	Berja, 11,414 E 4 Bilbao, 168,075 E 1 Bujalance, 14,250 D 4	Jaén (prov.), 690,937 E 4	Ronda, 33,123 D 4
Coimbra (district),	Bilbao, 168,075 1	Jativa, 15,185 3	Sabadell, 44,417
387,808B 2	Bujalance, 14,250 D 4	Játiva, 15,185	Sagunto, 18,831
Covilha, 15,640	Burgos, 40,800	Jerez de los Caballeros,	Salamanca, 49,001
Elvas. 11.747	Burgos (prov.), 359,073 E 1	13,607	Salamanca (prov.),
Evora, 22,061	Burriana, 15,533	Jumilla, 20,564F 3 Lalín, 20,900	342,606 D 2 Salas, 14,936 C 1
Evora (district), 180,852, C 3	Cabeza, 12,398	Langreo, 40,224	San Fernando, 29,866C 4
Faro, 18,019	Cáceres, 24,352	Lavadores, 31,677 B 1	Sanlúcar, 26,926
Faro (district), 300,/62B 4	Cádiz, 75,581	Lebrija, 13,357	San Roque, 10,672 D 4
Guarda, 8,158	Cádiz (prov.), 500,033D 4	León, 28,727	San Sebastián, 81,797F 1
Guarda (district),	Calahorra, 11,902E 1	León (prov.) 447.826 D 1	Santander, 87,664 D 1
267,614	Calatayud, 15,167 E 2	Tárido 30 000 C 2	Santander (prov.),
Ilhavo, 11,250	Campanario, 10,074 D 3	Lérida (prov.), 314,389 G 1 Linares, 41,525 E 3	371 A77 D 1
Leiria, 6,147	Cangas, 23,007	Linares, 41.525 E 3	Santiago, 39,620
Leiria (district), 314,340.B 3	Caravaca, 21,560 E 3	Linea, La, 34,/82 4	Santiago, 39,620
Lisboa (Lisbon, capital), 594,390	Carballo, 16,565, B 1	Llanes, 24,490	Savinao, 11,393 L
Lisboa (district), 906,582 B 3	Carcagente, 15,096 F 3	Logroño, 35,849 E 1	Segovia, 18,413 E. 2
Loulé, 18,585 B 4	Carmona, 21,536	Logroño (prov.), 205,961.E 1	Segovia (prov.), 175,575 .D 2 Sevilla, 233,393 D 4
Olhão, 13,934	Carolina, La, 16,345 E 3	Loja, 21,400 E 4	Sevilla, 233,393 D 4
Oporto (Porto), 232,280. B 2	Cartagena, 102,705 F 4	Lora, 11,373 D 4	Sevilla (prov.), 825,680D 4
Ovar, 12,729	Caspe, 9,992	Lorca, 61,392 F 4	Siero, 30,869
Portalegre, 11,005 C 3	Castellón de la Plana,	Luarca, 25,482	Soria, 10,246
Portalegre (district),	37,246	Lucena, 26,933 D 4	Soria (prov.), 157,130 E 2 Sueca, 17,521 F 3
166,343	Castellón de la Plana	Lugo, 32,259	T. 1
Porto (Oporto), 232,280 B 2	(prov.), 309,118F 2 Castro-Urdiales, 12,588E 1	Madrid (capital),	Tarazona 0 510 E 2
Porto (Oporto), 232,280 B 2 Porto (district), 810,253 B 2	Cataluña (Catalonia)*G 2	993,646	Tarifa 12 582 D 4
Povoa de Varzim, 12,700.B 2	Cazalla, 10,004	Madrid (prov.), 1,447,936 E 2	Tarazona, 9,510
Santarém, 12,106B 3	Cazorla, 11,246 E 4	Mahón, 17,954	Tallagolla (plov.),
Santarém (district), 378,517	Cehegin, 15,258	Málaga, 195,281	349,773
Setubal, 46,398	Chamartín de la Rosa,	Málaga (prov.), 624,986 D 4	Tarrasa, 37,470
Setubal (district),	38,875	Mallorca (Majorca, is.),	Teruel, 13,524 F 2
233,668B 3	Chantada, 15,469 C 1	298,536H 3	Teruel (prov.), 252,921 . F 2 Tineo, 24,038
Tavira, 12,762	Chiclana, 15,106	Manacor, 15,765	Toledo, 26,907
Torres Novas, 10,746 B 3	Ciudadela, 10,348H 2	Manzanares, 18,334 E 3	Toledo (prov.), 498,732D 3
Vianna do Castello,	Ciudad Real, 23,270D 3	Martos, 23,682 E 4	Tolosa, 12,307
11,819B 2 Vianna do Castello (dis-	Ciudad Real (prov.),	Mataró, 28,114	Tomelloso, 25,809 E 3
trict), 240,261B 2	504,599E 3	Mazarrón, 14,120 F 4	Torrelavega, 15,566D 1
	Ciudad-Rodrigo, 9,426C 2	Medina del Campo,	Tortosa, 35,315
Vila Nova de Gaya, 14,861	Coin, 15,222 D 4	12,295 D 2	Totana, 13,842
Vila Real. 6.602	Constantina, 14,543 D 4	Menorca (Minorca, is.), 42,791	Trujillo, 11,228
Vila Real (district).	Córdoba, 109,068 D 4	42,791	Túy, 12,602B 1
253,994	Córdoba (prov.), 689,742 D 3 Coruña, La, 76,574 B 1	Mieres, 43,013	Ubeda, 27,225 E 3
Viseu, 9,471	Coruña, La (prov.),	Minas de Ríotinto,	Utiel, 11,877 F 3
Viseu (district), 431,473 C 2	779,441B 1	10,320	Utrera, 23,015
SPAIN	Cuenca, 15,487 E 2	Miranda, 12,296 E 1	Valdepeñas, 26,126 E 3
Adra, 10,359 E 4	Cuenca (prov.), 315,129. E 3	Monforte, 15,804	Valencia, 12,462
Aguilar, 15,896	Cuevas, 14.153	Monóvar, 10,031 3	Valencia, 334,129 G 3
Aguilas, 15,903 F 4	Cullera, 13,244	Montijo, 10,165	Valencia (prov.),
Aguilas, 15,903 F 4 Alava (prov.), 105,278 E 1	Dalías, 11,039 4	Montilla, 19,508 D 4	1,065,424F 3
Albacete, 43,892 E 3	Denia, 13,286	Mora, 11,020	Valladolid, 93,969D 2
Albacete (prov.), 340,824 E 3	Don Benito, 21,095 D 3	Morón, 22,526	Valladolid (prov.),
Albox, 10,439 E 4	Écija, 29,375	Mula, 13,088F 3	305,713
Alcalá, 13,001 E 2 Alcalá la Real, 21,377 E 4	Eibar, 12,984 E 1	Murcia, 162,251 4	Valls, 11,202 G 2
Alcázar 24 324 F 3	Elche, 36,995 F 3	Murcia (prov.), 646,812F 4	Valls, 11,202
Alcázar, 24,324E 3 Alcira, 21,164F 3	Estepona, 10,457 D 4	Muros, 11,781 B 1	Veier, 18.027
Alcoy, 39,002 F 3	Felanitx, 11,960	Navarra (prov.), 349,090.F 1	Vélez-Málaga, 27,662 E 4
Algeciras, 20,674 D 5	Ferrol, El, 37,662 B 1	Nerva. 16,870	Vich, 14,018
Alhama, 10,042 F 4	Figueras, 14,106	Nijar, 10,382 E 4	Vigo, 65,983
Alnaurin, 10,431 D 4	Fonsagrada, 17,896C 1 Formentera (island),	Noya, 12,326 B 1	Villacarrillo, 14,153E 3
Alicante, 76,101	Formentera (Island),	Oliva, 12,231	Villafranca, 13,666 D 3 Villalba, 17,417 C 1
Alicante (prov.), 552,589.F 3 Allariz, 9,345	3,220	Olivenza, 11,810	Villalba, 17,417
Aller, 24,928	Fuente, 10,974	Olvera, 11,197 D 4	Villarreal, 19,101 3
Almadén, 11,888	Gandía, 13,850 G 3	Onteniente, 12,407F 3	Villarrobledo, 17,411 E 3
Almansa, 14.745 F 3	Gerona, 22,242	Orense, 21,461	Villaviciosa, 24,134D 1
Almendralejo, 17,451D 3	Gerona (prov.), 325,539 H 1	Orense (prov.), 428,763 C 1	Villena. 17.250 F 3
Almería, 54,736 E 4	Gijón, 78,173	Orinuela, 38,/12 3	Vitoria, 41,245 E 1
Almería (prov.), 338,240. E 4	Ginzo, 9,105	Ortigueira, 23,147	Vivero, 13,465
Almodóvar, 12,894 E 3 Alora, 11,665 D 4	Grado, 19,093	Osuna, 18,399	Vizcaya (prov.), 500,453.E 1 Yecla, 26,525
Andújar, 20,987 E 3	Granada (prov.), 657,785 E 4	Oviedo (prov.), 801,508 D 1	Zalamea, 11,516 C 4
Antequera, 32,910 D 4	Guadalajara, 15,919 E 2	Palas de Rey, 12,526 B 1	Zamora 20.507 D 2
Arahal, El, 12,209 D 4	Guadalajara (prov.).	Palencia 24 332 D 1	Zamora (prov.), 282,941.D 2
Aranjuez, 15,349 D 2	204.508 E. 2	Palencia (prov.), 210,722.D 1	Zamora (prov.), 282,941. D 2 Zaragoza, 180,574 F 2 Zaragoza (prov.), 544,100. F 2
Arcos, 17,643	Guadix, 22,008 E 4	Palma 87.746 H 3	Zaragoza (prov.), 544,100.F 2
Avila, 14,565	Guipúzcoa (prov.),	Pamplona, 44,205 F 1 Plasencia, 11,805 D 2	Andorra (semi-independent
Avilés, 16,213	311,146	Plasencia, 11,805 D 2 Ponferrada, 11,106 C 1	state), 5,231
Ayamonte, 13,848 C 4	Hercal, 11,622 F 4	Pontevedra, 30,566B 1	16,609D 4
			-,

†Vascongadas=The three Basque provinces of Alava, Guipúzcoa and Vizcaya. *The semi-autonomous state of Cataluña, created by the Cortes on Sept. 10, 1932, includes the four provinces of Barcelona, Lerida, Gerona and Tarragona.

6735

the magnificent Moorish cities of Cordova, Toledo, and Valencia, were built. The country prospered and industries advanced.

The Visigoths, driven into the north, had established the small independent kingdoms of Leon, Navarre, and Castile. The kingdoms of Galicia, Aragon, Murcia, and Portugal had been established as the result of the division of the small kingdoms among the sons of the kings. The civilization of Spain during this period surpassed that of most of the other European countries. In respect to education and improvements in agriculture and commerce, the Spanish kingdoms showed a high stage of development. In the thirteenth century, all of

these Christian principalities united against the Moors, and the Moorish princes were subjugated by Castile, one of the most powerful of the small kingdoms.

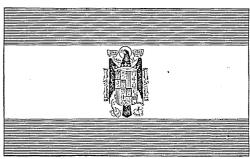
The Union of the Independent Kingdoms. Aragon and Castile continued to develop, and in 1469 Ferdinand V of Aragon married Isabella of Castile. Ten years later, these two king-doms were united, and the fusing of the many independent states into a political unity was begun. The history of the next hundred years, during the reigns of Ferdinand and Isabella, Charles V, and Philip II, is one of continued success and added glories. Ferdinand and -Isabella used their royal prerogatives to the very last degree, and everything and everybody were subjected to their dictates. Hoping to gain Papal favor, the Catholic sovereigns determined to extend the Christian religion to all their people, and the horrors and excesses of the Spanish Inquisition followed. Functioning as a department of the royal government, the Inquisition ferreted out even the most remote suspicion of heresy, and exerted par-'ticular pressure on the Jews and Mohammedans in Spain. During the period of expansion, the Moors lost their last stronghold at Granada. The discovery of America, under the patronage of Isabella, extended the kingdom abroad. Mexico, Central America, Peru, Venezuela, Chile, Cuba, Jamaica, and Santo Domingo were acquired; conquests extended to Africa and to Malacca and the Spice Islands in Asia; and, with the acquisition of the Philippines, the Spanish Empire girdled the globe. The European conquests included Navarre, Roussillon, Portugal, the Netherlands, Naples, Sicily, Sardinia, the Canaries, and the Balearic Islands. Spain had become "the mistress of the world

The Decline of Power. Spain's glory did not last long. In 1588 the naval supremacy of the kingdom was lost to England, when the famous Armada was shattered. In the seventeenth century, under Philip III, Philip IV, and Charles II, insurrection, religious persecution, bankruptcy, and civil war weakened the kingdom. The Netherlands were lost [see Netherlands were lost [see Netherlands were lost]

and queen of the ocean.'

LANDS, THE (History)]. At the close of the War of the Spanish Succession (see Succession Wars), Spain had to relinquish Naples, Parma, Sardinia, and Milan to Austria, Sicily to Savoy, and Gibraltar and Minorca to England.

Relations with England and France. A short period of prosperity followed, but at the close of the eighteenth century, Spain unfortunately entered the war against the French republic, losing Santo Domingo to France. An alliance was then made with France against England, but the British victory at Trafalgar, October, 1805, permanently destroyed the Spanish naval power. Napoleon later conferred the Spanish throne upon his brother Joseph, and war with France followed. Napoleon victoriously entered Madrid, December 4, 1808, but French occupation of Spain met with more persistent resistance than Napoleon calculated—a condition which caused the rest



THE FLAG OF SPAIN

Top and bottom stripes red, center yellow.

of Europe to doubt his insuperable power. Believing his position to be secure in Madrid, Napoleon continued his conquests in the provinces.

Joseph Bonaparte was desirous of building up an independent empire which he would rule, but his brother fully intended to annex this peninsula to his own already vast territory. A Cortes, or Congress, was held in 1810 to proclaim allegiance to the new king, Joseph, and to give formal sanction to his laws and decrees, which formed practically a new Constitution, promulgated in 1812. Most notable of these changes were the suppression of the Inquisition, secularization of Church lands, abolition of feudal rights, and other regulations curtailing the power of the Church. The Spaniards submitted to these reforms not because they approved of them, but because many years of domination by the Church had accustomed them to obedience; further, the leaders firmly believed that the invaders would soon be routed, and that this new Constitution could then be laid aside. It was the support of Great Britain which enabled Spain to throw off Napoleon's rule. The Peninsular War, which occupied Spain, Portugal, and Great Britain against Napoleon from 1807 to 1814, had up

to 1810 made more progress in Portugal than in Spain. Napoleon had left a large army under Masséna in Spain, hoping to keep the British back, and if possible to force them out of Portugal. However, the Duke of Wellington and his men were at hand to prevent this contingency, and Wellington's consistent victories, aided by the Spanish troops, were responsible

SPAIN

for French defeat in Spain, which was complete by the end of 1813.

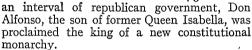
The Spanish king, Ferdinand VII, was restored to his throne in March, 1814, and the Constitution of 1812 was immediately revoked. During the struggles to save Spain from foreign domination, its colonies in the New World were revolting. Uruguay, Paraguay, Chile, Veneand New

Granada one by one threw off Spanish control. These losses, together with the despotism of the incapable and weak king, caused a military revolt which spread from a mutiny in Cadiz. The Inquisition and special privileges and powers of the clergy were abolished, the king was made a prisoner, and general anarchy and disorder reigned. The rest of Europe looked upon this civil strife not only as dangerous to Spain, but to the rest of the world as well. Alexander I of Russia had proposed intervention, only to be opposed by Great Britain and Austria, which foresaw danger to themselves.

Later, at the Congress of Verona, France sought permission to send troops to settle the internal difficulties, and, mindful of the previous activities of the French in Spain, England objected. Nevertheless, in 1823 the Duke of Angoulême entered Spain with his troops, and succeeded in restoring order in a short time. No sooner was Ferdinand back in power than he again repealed all liberal measures, and again attempted to set up the old order of bigotry and autocracy in Spain. The next few decades saw Spain torn between the conservative and cleric ideas of the king and Church and those of the liberal and progressive element

Ferdinand died in 1833, and at his request his daughter Isabella took the throne, with her mother, Maria Christina, as regent. Christina soon saw that she must seek her support from the liberals, for the clerical party, which called itself Carlist, championed Charles V as its candidate for the throne, and threatened to overthrow her. The queen regent was compelled to institute parliamentary reforms to retain her liberal following, for the intrigues of the Carlists were closing in upon her. This situation became so distasteful to her that, in 1840, she resigned the regency in favor of the

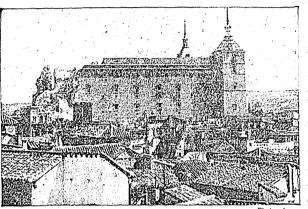
liberal Espartero. In 1868 Queen Isabella was forced to abdicate, in the midst of insurrection and revolt, and a provisional government was established. In 1870 the Assembly voted to make Spain again a monarchy, but, with the royal family banished, a ruler was sought in other countries. An Italian prince, Amadeo of Savoy, was elected, ruled two years, and resigned in 1873. After



Recent History. Alfonso XIII, last of the Spanish monarchs, was born a king in 1886. His mother, Maria Christina, acted as regent until he attained his majority in 1903. The principal event of the regency was the Spanish-American War in 1898 which resulted in the loss of Cuba, Porto Rico, and the Philippines, last vestiges of Spain's former overseas empire. Spain remained neutral during the World War.

In 1921 the Spanish army suffered a catastrophic defeat by the Riffian tribes of Spanish Morocco. On September 13, 1923, General Primo de Rivera, charging the grafting, inefficient politicians with responsibility for the Moroccan reverses and other troubles which beset Spain, led a successful coup d'état and took control of the government as dictator. Although an early return to constitutionality was promised, Rivera clung to the dictatorship until his successor, General Berenguer, announced the restoration of the Constitution in February, 1931, and called for elections to the Cortes.

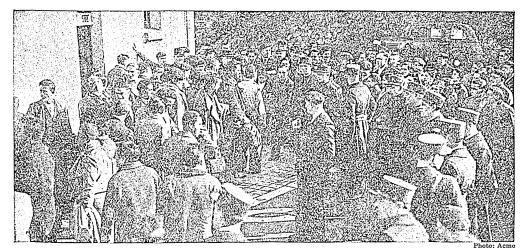
This announcement caused the political pot to boil over. All parties felt that a Parliament under the circumstances would be useless. Republican agitation became more vocal than ever. Berenguer was forced to resign,



THE HISTORIC ALCAZAR BOMBARDED

During the civil war, government forces in 1936 bombarded the rebel stronghold in the Alcazar. This views shows two towers destroyed. Later this old Toledo fortress was still further reduced.





SPANISH LOYALISTS AND REBELS TRADING PRISONERS

and the king chose Admiral Juan Aznar, a Monarchist, to head a ministry. His program called for elections and a convention to modify the Constitution. The elections on April 12 resulted in a repudiation of the monarchy. Aznar resigned, and the republicans demanded that the king abdicate. Alfonso refused, but he and the royal family left the country. Niceto

Alcala Zamora became provisional president of the newly proclaimed republic. The transition was accompanied by little violence.

On June 28, elections for the constitutional convention were held and the Socialist party won a decisive victory. At the conclusion of the convention and the adoption (December 10, 1931) of the progressive, socialistic Constitu-

OUTLINE AND QUESTIONS ON SPAIN

Outline

I. Position and Size

- (1) Latitude and longitude
- (2) Boundaries and size

II. The People and Cities

- (1) Population
- (2) National characteristics
- (3) Principal cities

III. Physical Features

- (1) The great tableland
- (2) Mountain ranges
- (3) Coastal characteristics
- (4) Rivers and lakes

IV. Industries and Transportation

- (1) Agriculture and forestry
- (2) Vast resources
- (3) Manufacturing
- (4) Railroads and highways

V. Government and History

- (1) Constitutional monarchy
- (2) The Republic
- (3) The early conquerors
- (4) An independent, unified kingdom
- (5) Decline of power and loss of colonies
- (6) Napoleonic era
- (7) Later nineteenth century
- (8) Spanish-American War
- (9) Later history

Questions

How is Spain "a country of contrasts"? What did the Greeks call this country? What part did Rome play in its early history?

Who is the best-known of Spanish writers, and for what is he famous?

Describe the processes by which the chief product of Spain's forests is secured and prepared for market.

How does the area of the colonial possessions compare with that of Spain itself?

Describe the racial composition of the Spaniard.

When, how, and to whom did Spain lose its position as "queen of the ocean"?

What is the chief sport of the country? Describe it.

What part of Spain belongs to Great Britain? How long has it belonged?

How did a king and queen of this country influence the history of America?

What is the Neutral Ground in Spain? What does it connect?

Tell the story of Rivera's dictatorship. What were the causes of the Spanish Civil War? tion, Zamora was elected President. The Jesuits were expelled and other religious orders were either suppressed or brought under closer state surveillance. A royalist uprising was suppressed, the leaders were imprisoned, and many of the nobility were exiled.

On September 28, 1932, the Catalans were granted home rule. Colonel Francisco Macia (died 1933) was chosen first President.

The Cortes was dissolved on October 9, 1933, and in the elections of November 19, the Conservatives were victorious. A general strike, which was called in protest at the rising power of the Catholic party in the government, led to a workers' insurrection in 1934. The rebellion was promptly suppressed. In an effort to save the Republic from its enemies, the Conservatives, President Zamora dissolved the Cortes. In the subsequent elections of February 16, 1936, a combination of the Left, called the Popular Front, was victorious. The new Cortes at once removed Zamora and, on May 11, 1936, elected Manuel Azana President. From February to July, unprecedented violence and disorder reigned in Spain, as a war of reprisals was waged between the Right and Left factions.

On July 17 a revolution was proclaimed in Spanish Morocco by General Francisco Franco, who took with him almost the entire regular army. Unexpected resistance by the workers, who organized a Loyalist militia, saved Madrid and the eastern third of Spain. Then Spain became the battleground of the ideologies, for, contrary to a nonintervention formula agreed to by the Powers, Germany and Italy gave assistance to the Rebels, whereas Communist Russia came to the aid of the Loyalists. In the end Fascist assistance was decisive. The Rebels drove a wedge through the heart of Loyalist Spain, separating Catalonia from Valencia and Madrid. In March, 1939, the war ended, and Franco set up a Fascist dictatorship. Tangier (which see) was annexed in 1941.

Related Subjects. See, also, the following:

HISTORY

Alfonso XIII Inquisition Alhambra Alva, Duke of Isabella of Castile Armada MoorsCastile and Aragon Morocco Charles (V, Holy Roman) Ferdinand V Navarre Primo de Rivera, M. Riff, The Gonsalvo de Cordova Granada Spanish-American War Hamilcar Barca Succession Wars Hannibal Torquemada, Tomas de

LEADING PRODUCTS Copper Grape Sheep . Lead Wine Mercury

Cork

Fig

SPALATO, spah lah' toh. See YUGOSLAVIA (Transportation and Commerce).

SPANIEL, span' yel, a name applied to a group of dogs of high intelligence, consisting of field and water hunting dogs and several smaller breeds of the fancy or "toy" variety. Among the field hunters are the Chumber, Sussex, Norfolk, Springer, and Cocker; all willing, in-The lap spaniels include stinctive hunters.

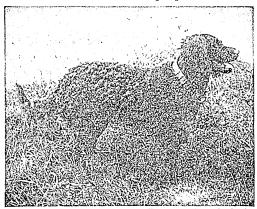


Photo: Visual Education Service

A WATER SPANIEL

the King Charles, the Blenheim, and the Japanese. All varieties have long bodies, drooping ears, and a thick, silky coat. They show a variety of colors, including liver and white, red and white, and black and white. The spaniels are prized because of their intelligence, beauty, and gentle disposition. See Dog.

SPANISH-AMERICAN WAR, a brief war in 1898 between Spain and the United States, but important in its effects upon the world. The contest grew out of the severity and injustice of Spanish colonial administration in Cuba. The policy of successive captains general, entrusted with the government of the island, had for half a century alternated between ineffectual efforts at conciliation and the utmost severity. Taxes were heavy, and the island became involved in serious financial difficulties. The demand for radical reforms and a measure of self-government became more and more insistent. Revolt succeeded revolt; despotism on the one hand was matched by anarchy on the other, culminating in 1895 in an insurrection of formidable proportions.

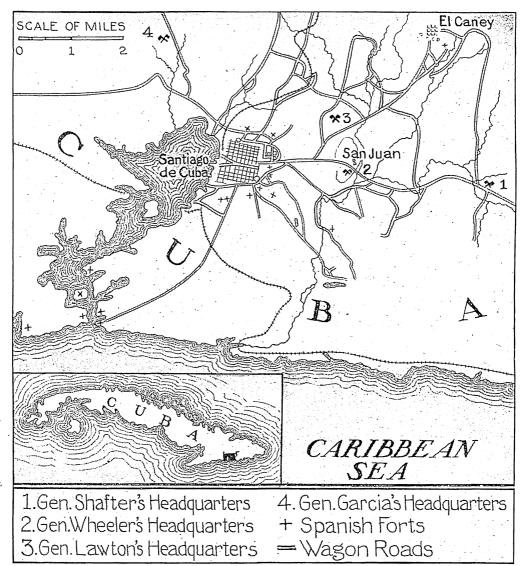
Extreme measures were adopted by General Weyler, the Spanish governor, against Maximo Gomez and other Cuban chiefs, who were penned in narrow parts of the island by lines of intrenchments, barbed-wire entanglements, and forts, called trochas. Women and children, and non-combatants generally, were treated with great cruelty, being herded into camps and surrounded by armed guards. They were insufficiently supplied with food, and were kept alive largely by assistance from the wretched people among whom they lived, and by supplies sent from the United States. Reports of atrocities committed by Spanish soldiers had been frequent, and had inflamed the feelings of peo-



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SCENE OF THE PRINCIPAL CAMPAIGN

The small corner insert shows, in its black area, the part of Cuba pictured in the large map.

ple in the United States, already exasperated by years of misrule and anarchy almost at their doors.

President McKinley had steadily opposed recognition of the rebellion; at the same time, he had affirmed the possibility of intervention, and the American attitude was naturally resented by Spain. On the night of February 15, 1898, the American battleship *Maine* was blown up in Havana harbor. Responsibility for the disaster will doubtless never be fixed, but American public sentiment accused Spanish agents, and war became inevitable. Congress formally demanded the withdrawal of Spain from Cuba, but before the message could be

delivered, the American ambassador at Madrid was dismissed, and the Spanish government declared war, on April 24.

Chief Events. On April 22 Commodore Sampson, with the North Atlantic naval squadron, began a blockade of Havana and the north coast; while Commodore Dewey was ordered from his station at Hong Kong to the Philippines, a Spanish possession. Dewey's Asiatic squadron fought the first important engagement of the war at Manila Bay, on May 1, destroyed the Spanish fleet, seized Cavite, and awaited the arrival of land forces to reduce Manila, which was finally accomplished on August 13 (see page 6741).

Meanwhile, a Spanish squadron under Admiral Cervera had reached Santiago from the Cape Verde Islands and anchored under the protection of the forts in Santiago harbor.

The American forces attempted to close the channel by sinking the collier Merrimac, the feat of Captain Hobson, but in this they were not completely successful. Acting on orders from Madrid, Cervera attempted to run the blockade, steaming out under forced draft on July 3. The gunfire of the Americans proved to be vastly superior to that of the enemy, and after a brief but hot running fight, the entire Spanish squadron was sunk or beached. Commodore Schley, in Sampson's absence, directed Cervera himself was the battle. wounded. A land force under Major General Shafter had reached the island on June 20, and after defeating the most of which was due to disease, was about 2,500.

Minor Incidents. Captain Clark's ship, the battle cruiser *Oregon*, was ordered to join the

Atlantic squadron after the Battle of Manila Bay. It made the 12,000-mile voyage around Cape Horn from Puget Sound in a remarkably short time, and reached Cuban waters in perfect condition.

The war fixed public attention upon Commodores Schley and Sampson, who became rivals, or were made so, by their respective champions. Both were advanced to the grade of rear admiral.

Theodore Roosevelt, second in command of the "Rough Riders," had been Assistant Secretary of the Navy and a reform politician in New York state. The war focused the nation's attention upon him, and his election as governor of



MAINE MEMORIAL

Unveiled in March, 1925, by the government of Cuba in memory of the 266 Americans who died when the battleship *Maine* was sunk in the harbor of Havana on the night of February 15, 1898. It occupies a dominating spot overlooking the harbor.

Spanish at San Juan and El Caney, had invested Santiago. In this campaign, the "Rough Riders," under Wood and Roosevelt, distinguished themselves. On July 4 the city was called upon to surrender, but it continued to offer resistance until July 17. With its fall, Spain sued for peace; a protocol was agreed to on August 12, and peace was declared on December 10, when the Treaty of Paris was signed

signed.

The Peace Treaty. By the Treaty of Paris, Spain evacuated Cuba and relinquished Porto Rico, the Philippines, and Guam to the United States, in return for a generous indemnity of \$20,000,000. It was expressly understood that the American interest in Cuba was to be a simple trusteeship, and that a republic, guaranteed by American arms, was to be established on the island. The cost of the war to the United States cannot be estimated entirely from the actual expenditures during the four months of fighting, for the additional territory and international prestige which victory brought to the United States entailed a larger permanent budget for military and naval purposes. The loss of life for the American forces,

New York followed the same year. From that post he was chosen Vice-President of the United States, and became President upon the death of McKinley. Colonel Wood of the "Rough Riders" remained in the service, and by merit rose to the command of the American army.

The Battles in Detail. The following engagements are worthy of note:

El Caney, el kah na', fought four miles northeast of Santiago de Cuba, July 1, 1898, between 4,500 United States troops commanded by General Lawton, and Spaniards led by General Vara del Rey. The Spanish troops were well intrenched, and although numbering only 520, offered stubborn resistance. The Americans won the day, the casualties on each side numbering more than 300.

Manila Bay, a naval battle, the first important engagement of the war. It was fought in the Bay of Manila, in the Philippine Islands, May 1, 1898, between an American fleet under Commodore (later Admiral) George Dewey, and a Spanish fleet of about equal strength under Admiral Montojo, the latter supported by land batteries. The American fleet, which at the declaration of war was in Chinese waters, had proceeded to the Philippine Islands. Dewey attacked the Spanish fleet, and in a battle lasting several hours, ten Spanish ships were sunk or

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destroyed, and about 400 Spanish sailors were killed or wounded. The Americans did not lose a ship or a man, and only seven were wounded. Dewey was soon reinforced by land troops under General Merritt, and on August 13 the city of Manila was taken. Thus the Philippine Islands, which had been held by the Spanish since the days of Magellan, came into the possession of the United States.

Santiago, a naval battle fought off Santiago de Cuba, on July 3, 1898. The United States fleet, commanded by Sampson and Schley, was unable to enter the harbor on account of strong fortifications, and stood guard before the entrance to prevent the escape of the Spanish fleet under Admiral Cervera. On July 3 that fleet attempted to make a dash from the harbor, but was pursued by the American squadron; after a running fight, six Spanish boats were destroyed or forced ashore. Admiral Cervera and over 1,700 officers and men were taken prisoners. The loss of life on the Spanish vessels was large, but among the men of the American fleet, only one was killed and only ten were wounded.

Related Subjects. Much supplementary information may be found in the following articles:

Dewey, George Hobson, Richmond P. McKinley, William Paris, Treaties of Philippine Islands Porto Rico

Roosevelt, Theodore Rough Riders Sampson, William T. Schley, Winfield Scott Spain (History) United States (History) Wood, Leonard

SPANISH ARMADA, BATTLE OF THE. See ARMADA; FIFTEEN DECISIVE BATTLES.

SPANISH MAIN. See Caribbean Sea. SPANISH MOSS. See Air Plants.

SPANISH SUCCESSION, WAR OF THE. See Succession Wars.

SPANISH TOWN, a seaport in Jamaica

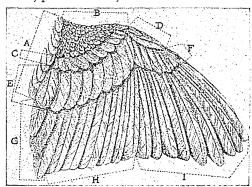
SPARK COIL. See RADIO COMMUNICATION. SPARKS, JARED (1789-1866), an American clergyman, historian, educator, and biographer, distinguished as the pioneer in the collection of original documents relating to American history, and as one of the earliest American biographers. He was born at Willington, Conn., and became a minister of the Unitarian Church. He resigned from the ministry in 1823, and from 1824 to 1831 was editor of the North American Review. From 1839 until 1849, he was professor of history at Harvard University, his alma mater, and from 1849 to 1853 served as president. His greatest activity, however, was in the fields of biography and history.

One of the best-known works of Sparks is his edition of the Writings of George Washington, in twelve volumes, the first volume of which is a biography of Washington. He also edited The Library of American Biography, the writings of Franklin, and various collections of documents and letters. His great collection of manuscripts he bequeathed to Harvard University, and his private library was purchased

by Cornell University.

SPARROW, the name applied to many species of plain-appearing song birds, with

cone-shaped bills adapted to the shelling and eating of seeds. They are found in all parts of the world except the Australian region. Most species are migratory; those nesting in the Northern United States and Canada winter in the Gulf states. Among the best-loved of American species are the song sparrow, with its clear, high trill; the vesper sparrow, with its sweet, plaintive note; and the beautiful white-



WING OF A SPARROW

- Scapulars Lesser coverts Middle coverts
- (d) Ala Spuria (false wing)
- Greater coverts Primary coverts Tertiaries
- Secondaries (i) Primaries

throated and white-crowned sparrows. largest of the group are the fox sparrow and the Harris sparrow of the Western prairies, the latter a species having much black splashed about its head and breast. Both fox and Harris sparrows gather in flocks on spring mornings and evenings, and sing enchantingly in chorus. The tree sparrow, or winter chippy, and the chipping sparrow are marked with chestnut crowns. The field sparrow frequents dry pastures and hillsides.

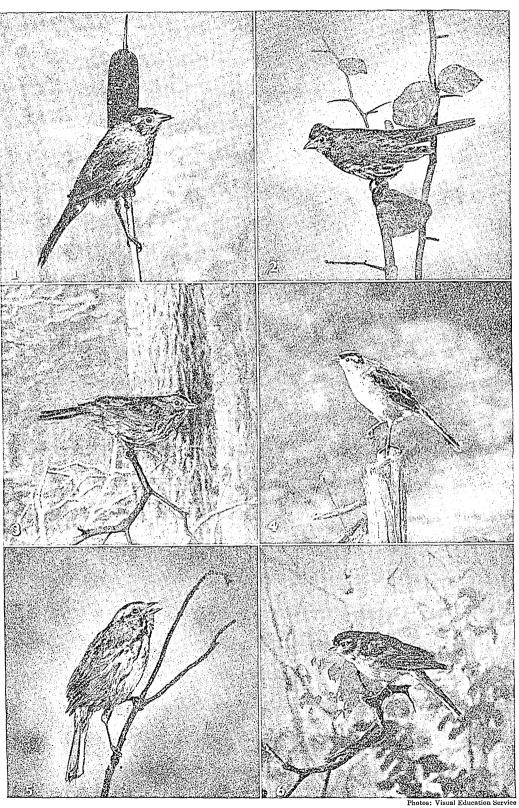
The English, or house sparrow, a nondescript bird found about houses and villages in most parts of the Old World, belongs to the weaverbird family. It was introduced into the United

States in the middle of the last century, and has spread with incredible rapidity to all sections, competing with wrens, martins, bluebirds, and even mocking birds, and replacing their songs with its continual strident chirpings. It rears three or four broods in a season,



FOOD OF THE CHIPPING SPARROW

building in any available place of any available material, proving a pest about buildings, especially in eave troughs and drains. The eggs are five to seven in number, generally white in color, marked with olive.



Some of the Sparrows. (1) Swamp sparrow. (2) Fox sparrow. (3) Lincoln's sparrow. (4) White-crowned sparrow. (5) Song sparrow. (6) Chipping sparrow.

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Though some contend that the English sparrow is valuable in the destruction of the seeds of noxious plants, the general agreement is that we should be better off if we could exterminate the noisy little alien and invite back our former bird neighbors. This is the only sparrow not regarded as beneficial.

D.L.

Scientific Names. The English sparrow belongs to the Placeidae family; others, to the family Fringillidae. The song sparrow is Melospiza melodia; the western vesper, Pooceeles gramineus confinis; the white-throated, Zonotrichia albicollis; the white-crowned, Z. leucophrys; the Harris, Z. querula; and the fox, Passerella iliaca. The tree is Spizella arbora; the chipping, S. passerina; and the field, S. pusilla.

SPARROW HAWK, the smallest North American member of the group of true falcons. It breeds from Northern Canada to Northern Mexico, and winters in the Southern United States and south to Guatemala. The back and shoulders of the male are marked with reddishbrown and black, and its wings are a grayish-The sparrow hawk is commonly seen perched on dead trees, telegraph poles, and other elevations, watching for its food, which consists of insects, small rodents, reptiles, and sometimes smaller birds. It nests in holes in trees, and occasionally on buildings in towns. It is about the size of a mourning dove, but has a longer tail. It is easily identified by its call note, "killy, killy, killy," The eggs are five to seven in number, creamy white to reddish in color, marked with brown. Because of the good service it renders in destroying harmful insects and rodents, the little sparrow hawk should be encouraged and protected. See FALCON.

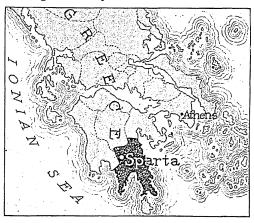
Scientific Name. The sparrow hawk belongs to the family Falconidae. Its scientific name is Falco sparverius.

SPARTA, famed in Grecian history as the land of warriors and the abode of war, was the capital of Laconia, and at one time the most powerful city state in ancient Greece. It was picturesquely located in the northern part of the central plain of Laconia, about thirty miles from the Mediterranean Sea and on the right bank of the Eurotas River. Laconia was the southernmost division of that part of Greece known as the Peloponnesus. Sparta was in reality a community of five different villages having a common market place. The settlement lacked a rock citadel, such as its rival, the city of Athens, possessed in the Acropolis, but Sparta was so safeguarded from invasion by mountain barriers that it developed into a powerful state on the level plain, without even a wall about it.

Early History. According to tradition, the city was founded by Lacedaemon, a son of Zeus by the mortal Taygete. The legend has it that Lacedaemon married Sparta, a daughter

of Eurotas, and named the city for his wife. While many details of the authentic history of the settlement are unknown to us, it is generally accepted that the city was taken over by the Dorians, about 1000 B.C., when they invaded the Peloponnesus. These Dorians were the ancestors of the Spartans.

In the latter part of the ninth century, a great lawgiver appeared—Lycurgus—who framed a new constitution or perhaps revised one already existing. The adoption of this constitution laid



LOCATION MAP

the foundations for the prosperity and growth of the Spartan state. It provided for two kings who ruled jointly, a senate of elders, twenty-eight in number, a governing board of five ephors, and a general assembly composed of all Spartan citizens over thirty years of age. Rigid military training was imposed, a system that produced men of iron nerve and women who said to their sons, as they departed to battle, "Come home with your shield or upon it." This stern training deserves special description.

Training the Spartan Boy. Every Spartan belonged to the state from the time of his birth, according to the laws of Lycurgus. When a boy was born, his father was obliged to bring him before the elders to be examined. They decided whether the child should be reared or left to die. If it was robust and well proportioned, they issued orders for its education, and assigned to it a certain share of land, as the Spartans were forbidden by law to engage in manufacture or trade. If, however, the child was weakly or deformed, its life was considered worthless, and it was cast into a deep cavern in the mountains and left to perish.

A boy was left to the care of his parents until seven years of age, when he was enrolled in a company consisting of fifteen members, all of whom were kept under the strictest discipline. From the age of seven, every Spartan was compelled to take all his meals with his particular company, in a public dining hall.

The bravest boy in a company was made captain, and the others obeyed his commands and bore such punishments as he meted out to them.

When the boys were twelve, their undergarments were taken away, and only one outer garment a year was allowed them. Their beds consisted of the tops of reeds, which were gathered with their own hands without knives.

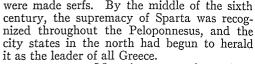
arts of reading and writing were not considered essential, but leaping, running, wrestling, and wielding a weapon with grace and accuracy were accomplishments which must be cultivated. At about the age of thirty, the Spartan attained full maturity and enjoyed the rights and duties of citizenship. The sixtieth year closed the military career, and thereafter a citizen was employed either in public affairs or in the training of the

young, according to the prescribed rules. As a result of this system, the Spartans became distinguished for the wonderful perseverance and patience with which they endured

every conceivable hardship and suffering. From childhood, life was one continued trial of patience; on certain religious occasions, a boy would voluntarily ascend the altar and submit himself to the most cruel lashings. These sometimes lasted a whole day, and from them victims would frequently expire without

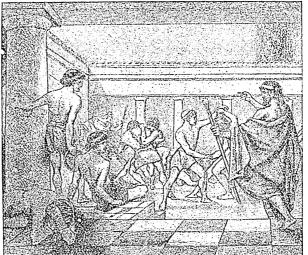
a groan.

Rise to Supremacy. After the organization of the state under Lycurgus, Sparta gradually conquered all of Laconia. The territory known as Helos was utterly subjugated, and its people were made state slaves. [The word helot is derived from this circumstance.] Another class also developed—the Perioeci ("Dwellers Around"). These were conquered people who were allowed to retain their lands and till them, but were compelled to pay tribute to the Spartans. In time of war, they were forced to fight for their overlords. It is noteworthy that the Spartans, though absolute masters of Laconia, represented only a small proportion of the total population. Other conquests followed. Messenia, the most fertile district in the Peloponnesus, was subjugated between 743 and 630 B.C., and the Messenians



The Decline. Meantime, a state beyond the Peloponnesus was rising to power—Athens—a state in which art, literature, and philosophy were supreme. The Athenians joined with the

> Spartans in repelling the invading Persians, and Athens emerged from the struggle with enhanced prestige, eventually becoming the dominating power in Greece see Greece (The Persian Wars)]. Athens, however, was conquered by its rival in the hard-fought Peloponnesian War, and in 404 B.C. was forced to accept a humiliating peace But the treaty. leadership claimed by Sparta was short-lived. cruelly did the



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THE TRAINING OF SPARTAN YOUTHS [From an old painting.]

Spartans rule over the other Greek states that they revolted and threw off the yoke. At the Battle of Leuctra, in 371 B.C., Sparta lost forever its claim to supremacy in Greece, and in 146 B.C. it passed with the rest of the country under the rule of Rome.

There is a modern town of Sparta near the site of the ancient city. It was laid out in 1834 and made the capital of the modern political division of Laconia. Excavations have been made on the old site, but no such interesting ruins as may be seen in Athens have been

Modern Interpretation. The spirit of perseverance and endurance which the people of Sparta personified is referred to as Spartan; hence the adjective is used to-day to describe one who is undaunted, courageous, and persevering, even under adversity.

Related Subjects. The reader is referred in these volumes to the following articles:

Athens Dorians (History of Greece)

Helots Lycurgus Peloponnesian War Peloponnesus

SPARTACUS, a Roman gladiator, the most famous of all time, although his glory was not achieved in the arena. He was the leader of a formidable slave rising, which nearly succeeded. Spartacus was born in Thrace, but was made prisoner by the Romans, sold as a slave, and

taken for training to a gladiatorial school in Capua. With seventy comrades he escaped from the school, and despite attempts of the soldiery to restrain him, established himself on Mount Vesuvius. Slaves seeking freedom flocked to him by thousands, and he was able to overcome in battle several Roman forces.

Leaving his mountain fastness when he felt that his army was large enough, Spartacus succeeded in gaining possession of almost all Two consuls were sent of Southern Italy. against him, but he defeated them both and led his followers toward the Alps, meaning to lead them out of Italy, that they might be free and return to their homes. The slaves themselves, however, were determined to march on Rome, and compelled Spartacus to lead them, but they lacked courage when the critical moment arrived. A fresh army under Marcus Licinius Crassus was sent against Spartacus; at first he defeated it as he had done before, but dissension broke out among his followers, and in 71 B.C. a pitched battle resulted in the annihilation of his army. He himself, having stabbed his horse, fought on foot, and showed incredible valor before he met his death. The rising subsided with the death of the leader. See GLADIATORS.

SPARTANBURG, S. C. See South Caro-LINA (back of map).

SPARTAN TRÂINING. See SPARTA (Train-

ing the Spartan Boy).

SPASM, spax'm, a more or less violent jerking and contortion of the muscles, is a symptom of several disorders. It is the most prominent symptom of epilepsy (which see), and is a common affliction of children suffering from intestinal trouble. It also occurs in many cases of poisoning, and is a late symptom of Bright's disease. The spasms, or "fits," that attack small children and babies should be treated as follows, according to the advice of a specialist:

Keep the child perfectly quiet with ice at the head, put the feet in a mustard bath, and roll the entire body in large towels which have been dipped in mustard water (two heaping tablespoonfuls of mustard to one quart of tepid water), and have plenty of hot water ready.

If the pulse is weak, the face very pale, the nails and lips blue, and the feet and hands cold, the hot bath will be useful by bringing blood to the surface and relieving the heart, lungs, and brain.

The temperature should not be over roo's F., tested by a thermometer. Without this precaution, infants have frequently been put into baths so hot that serious and even fatal burns have been produced. If no thermometer is available, the nurse may plunge her arm to the elbow into the water. It should feel warm, but not so hot as to be at all uncomfortable. One half a teacupful of powdered mustard often adds to the efficacy of the bath.

W.A.E.

SPATHE. See ARUM.

SPAVIN, *spav'* in, a colloquial name for two unrelated diseases affecting the hock of horses,

namely, bone spavin, a bony growth on the inner-lower aspect of the joint, and bog spavin, a distension of the synovial capsule (joint sac) of the main joint. The former, or true spavin, causes a troublesome lameness of indefinite duration, while the latter seldom causes any inconvenience. The bony type is caused by a deficiency in the mineral composition of the skeleton which leaves the joint susceptible to the injury of strain and concussion. The bog type is considered congenital. Both are incurable so far as removing the blemish is concerned. Affected horses are pronounced unsound in the markets.

The lameness of bone spavin is treated to shorten its duration and check the growth of the enlargement, by blistering the skin over the joint, by puncturing the growth with a pointed, hot iron ("firing"), by injecting diluted iodine beneath the skin covering it, or as a last resort, by severing the sensory nerve of the hock. Supplementing the feed with calcium and phosphates aids in rebuilding the mineral-deficient skeleton.

L.A.M.

SPAWN, the eggs of fishes, mollusks, frogs, and reptiles, especially when found in masses. Usually, they are produced in great numbers, particularly among sea animals which are preyed on by larger species, or which leave eggs and young to hatch and develop alone. The production of countless millions of eggs by water-inhabiting animals is necessary to keep the different species from extinction. It is an interesting fact that fresh-water fish often deposit their eggs in the sea, while sea fish often ascend fresh-water streams during the spawning season. The collected masses of eggs of certain fish are often used in making the delicacy known as caviar.

W.N.H.

Related Subjects. The reader is referred to:

Caviar Frog
Fish (Reproduction) Salmon

SPEAKER, the title of the presiding officer in the lower house of various national, state, and provincial legislatures.

In Great Britain this officer has presided over the House of Commons since 1377. The name is due to the fact that in the fourteenth century the Commoners had little part in lawmaking. All they could do was to send their grievances to the King in his Parliament, and the member selected to hear their petitions was called their speaker. In time, this officer came to preside over the House of Commons. In England today, the speaker is a paragon of impartiality, making his rulings in line with the will of the majority of the House, but, at the same time, never permitting the minority to be abused. The spirit of the office is typified by the saying of Sir William Lenthall who was speaker in 1642 on the occasion when Charles I strode into the chamber with soldiers demanding the arrest of the "five members." Replied Lenthall: "May it please your Majesty, I have neither eyes to see nor tongue to speak in this place, but as this House is pleased to direct me."

The speaker is elected by the House, which means that he is actually selected by the prime minister, leader of the majority party in the House. But once having been elected, it is the custom to re-elect the same speaker in every succeeding Parliament. Thus Captain Edward Algernon FitzRoy, the present Speaker, elected in 1928 under a Conservative ministry, served under the following Labour ministry. dignity is attached to the office. The incumbent has a salary of 5,000 pounds per year, with an official residence in the Palace of Westminster; he ranks as the seventh subject in the realm, immediately following the Lord President of the Council; and when he retires he is elevated to the peerage.

The United States. The speakership of the House of Representatives in the United States was modeled after the British office. But, instead of developing into a nonpartisan officer, the American speaker has become the recognized leader of his party in the House, and uses his office to promote the advantage of his party. The practice was frankly described by Speaker Longworth in 1925 as follows: "I believe it to be the duty of the speaker, standing squarely on the platform of his party, to assist in so far as he properly can the enactment of legislation in accordance with the declared principles and policies of his party, and to resist the enactment of legislation in violation thereof."

The change in the speakership began with Henry Clay, elected speaker in 1811. The office reached its culmination as a political force under the dominant personalities of Thomas P. Reed (1889-1899) and Joseph G. Cannon (1903-1911), Republican speakers. The speaker became almost an autocratic officer. His right to recognize members as entitled to the floor was used to promote submission to party dictation. Appointment to committees in his hands was employed to make or break members. As chairman of the Committee on Rules he exerted a powerful influence over all legislation. He was considered almost as important as the President himself. In 1910, a revolt of insurgent Republicans and Democrats against this leadership led to the curtailment of his powers. He was removed from the Committee on Rules, while the appointment of committees was transferred to election by the House. But even with this reduced authority, the speaker is important in national legislation.

The speaker has always been elected by the House, as is provided in Article I, section 2, of the Constitution. Previous to the convening of a new Congress, every two years, the members of the two majority parties, the Democratic and the Republican, meet separately in their

respective *caucuses* or party conferences. Each chooses a nominee for speaker, as well as a floor leader and steering committee. The candidate of the defeated party generally becomes floor leader for his party.

The fall of the speaker in 1910 gave the control of the House of Representatives to what is called "invisible government." The principal place in this mechanism is held by the steering committee, a body of about nineteen experienced members, selected by the caucus of the majority party. The various committees of the House are engaged in consideration of the bills, but it is the steering committee that determines the legislative program. "The steering committee," as a member of Congress in 1926 declared, "is all-powerful. It can and does forbid the consideration of any measure to which a majority of the steering committee is opposed." chairman of this committee is the floor leader, who keeps members in line with party decisions, manages debate on the floor of the House, confers with the minority leader as to the time of taking votes, and informs the speaker as to what majority members are to speak on certain bills

and resolutions. In recognizing members and putting motions, the speaker is governed by the rules of the House and by the precedents compiled in a monumental collection of eight volumes, Hind's Precedents of the House of Representatives. The speaker receives \$15,000 per annum as compared with \$10,000 for the representatives.

Related Subjects. The reader is referred to:

Congress
Mace
Representatives,
House of

SPEARFISH CANYON. See SOUTH DAKOTA (The Land).

SPEARMINT, a species of mint

SPEARMINT In blossom.

found in temperate regions in most parts of the world, which yields an oil used in the preparation of perfumes, medicine, chewing gum, candies, julep, soup, and sauce. The world's most important center of spearmint-distilling is Saint

Joseph County, Mich. This county also produces ninety per cent of the peppermint of the United States. The spearmint plant has smooth, erect stems that grow one or two feet in height and, at the top, bear whorls of palepurple or white flowers. This species of mint furnishes the flavoring for mint julep and for the sauce which flavors lamb or mutton. See MINT.

Scientific Name. Spearmint belongs to the family Menthaceae (or Labiatae). Its botanical name is Mentha spicata.

SPECIAL DELIVERY. See POSTOFFICE DEPARTMENT, subhead.

SPECIAL SENSES. See Senses, Special. SPECIAL SESSION. See Congress of the United States.

SPECIE, spe' shih, PAYMENTS, RESUMPTION OF. This is a term which indicates the beginning of circulation of specie (metal coins), or "hard money," as it is sometimes called, after a time of suspension of its use, during which time only paper money was circulated. Such suspension has occurred a number of times in the United States.

During the War of 1812, the United States government found it necessary to borrow more money than the state banks of the country could raise. This made it very hard for the people everywhere to obtain money, and it also kept money out of the banks, because people were afraid that, if they did deposit their money, they could not draw it out again. The situation was so serious that the government authorized the banks of the country to suspend the payment of specie, or coin, and to give out only paper money, called then credit money, which in times of stress was of uncertain value. The resumption of specie payments is usually very gradual, and it requires some time for the country to recover from the financial strain of such a crisis. In the instance referred to above, resumption did not begin until 1817, and it was several years before conditions were normal. Other similar experiences occurred in 1837-1838, 1846, 1857-1858, and a later one of most far-reaching effects followed the War of Se-

The Last Resumption. During the War of Secession, the banks of the country were obliged to suspend specie payment, and the people thereupon began to hoard their gold and silver, instead of entrusting it to the banks. As a consequence, the government issued a large volume of United States Treasury notes, generally called greenbacks, and compelled their circulation as money by making the people accept them in all business transactions. This gave temporary relief, and two similar issues were afterward made, so that, by the end of the war, there were over four hundred million dollars of such money in the United States.

What to do with this mass of paper money was a perplexing problem. The first fifty millions were gradually retired through the sale of government bonds. In 1869, however, Congress solemnly declared it to be the purpose of the United States to pay the green-backs in "coin or its equivalent." Accordingly, in 1875 a bill was enacted making arrangements to "resume specie payment" January 1, 1879. The Secretary of the Treasury was authorized to sell bonds and accumulate a store of gold for the purpose of redeeming, on demand, the greenbacks. But in 1878 Congress enacted that the volume of greenbacks then in circulation -\$346,681,016—should not be retired when presented for payment, but should be reissued and paid out again and kept in circulation.

The Treasurer accumulated a large fund of gold, and then it was discovered that the great mass of the people had no desire to exchange greenbacks for gold. They were as good as gold simply because the government was ready to exchange gold for them. In the next twelve years, only about \$28,000,000 were presented for redemption. From January 1, 1879, when the United States resumed specie payments, until 1933, when the gold standard was abandoned, all government issues were on a parity with gold.

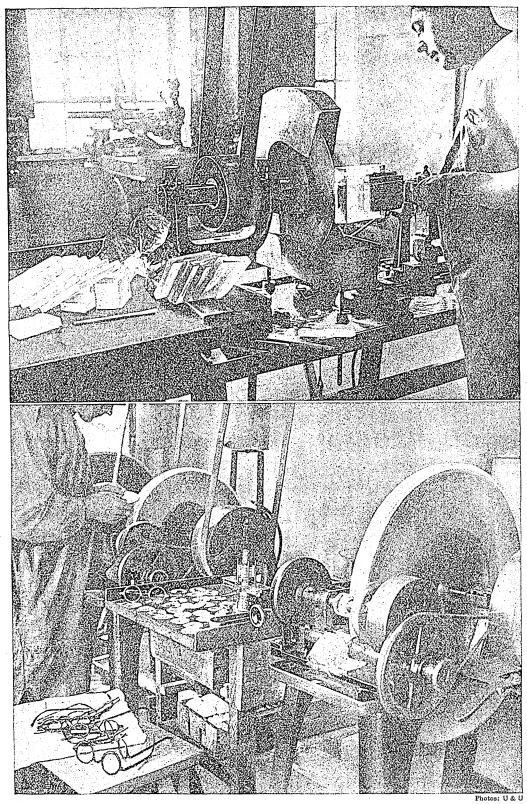
Related Subjects. The reader is particularly referred to the article Money (Monetary System of the United States: Paper Money). See, also, HAYES, RUTHERFORD BIRCHARD.

SPECIES, *spe'* sheez, in the classification of plants and animals, a group of individuals which reproduce their kind. All members of one species are alike in various essential particulars, and show a resemblance to a common ancestor. Several species are included in a genus, and a species may in turn be divided into varieties or subspecies. See Classification, for fuller explanation.

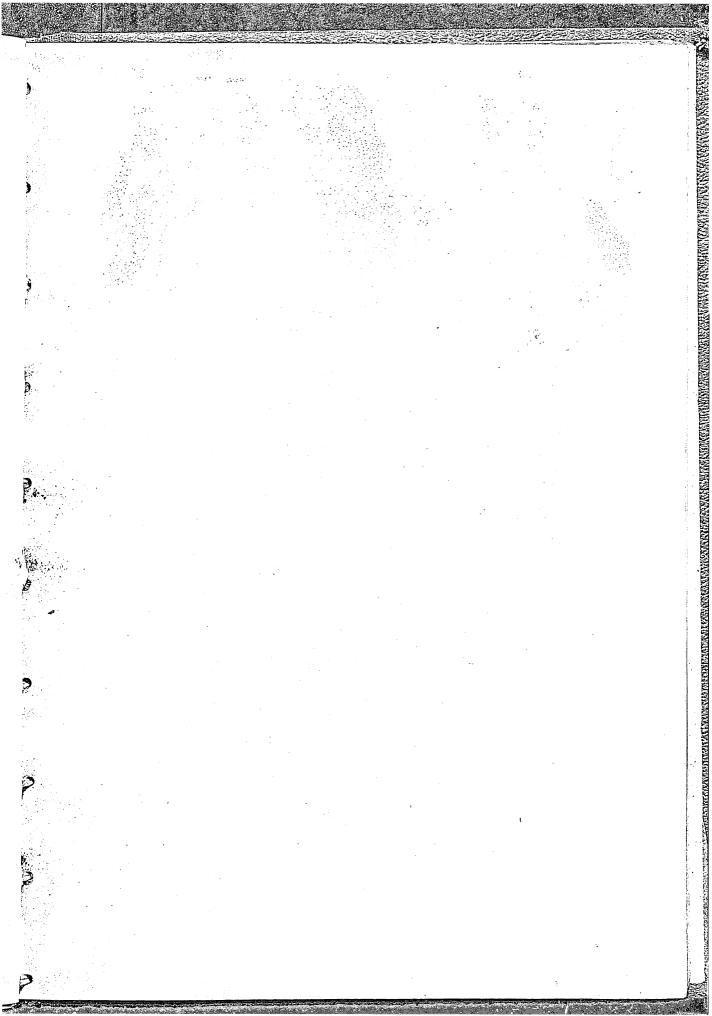
SPECIFIC, spe sif' ik, GRAVITY. See GRAVITY, SPECIFIC.

SPECTACLED SNAKE. See COBRA. SPECTACLES, the name given to an instrument or device for aiding and correcting defective sight, consisting of a pair of lenses, mounted in a frame to hold them in position before the eyes. The first device of this kind is said to have been invented by Roger Bacon, in the thirteenth century, but Italian antiquarians credit a Florentine monk with this achievement (1285). Regardless of its inventor, the first device of this kind was crude and clumsy; and was not greatly improved until the eighteenth century, when the grinding of lenses was first based upon the principles of the refraction of light (see Lens; Eye).

The lenses are made of clear or rock-crystal glass, and are ground to suit the defect of the eye. In cases of nearsightedness, a concave glass is used; by this means, the rays of light



How Spectacles Are Made. Above, the operator is shown using a diamond saw to cut up blocks of crude glass. Below, a detail of the process of grinding the edge of the lenses before fitting into frames. The intermediate process involves grinding each lens to meet the requirement of the prescription of the physician or optometrist. See Optometry.



are diverged and a clear image is formed on the retina. For farsightedness, the convex lens is used, converging the light rays. The thicker the lens, the greater is its magnifying power. Astigmatism, which is a structural defect of the eye, is remedied by cylindrical lenses which bring the rays of light to a common focus on the retina. The lenses are adjusted so as to make the distance of distinct vision about twelve inches from the eye.

When different lenses are needed for examining distant objects and those near the eye, divided spectacles, or bifocals, are used. These were invented by Benjamin Franklin. In bifocal glasses, each section consists of two semicircles of different focal power; the lower and smaller section is used for reading and close observation, and the upper section for looking at distant objects. When correctly fitted, spectacles can remedy most defects of vision, but if not exactly suited to the eye, they are injurious rather than beneficial. Therefore they should be fitted by a skilled person and changed whenever the eyes change. Colored glass is used in spectacles to protect the eyes from the glare of the sun.

The frame is made of tortoise shell or metal, usually gold, silver, or steel. It consists of a bridge, rims, sides, and bows which fit over the ears. Lenses supported on the nose by means of a spring and having no sides and bows are

called eyeglasses.

SPECTROGRAPH, spek' tro graf. See As-

TRONOMY (How Astronomers Work).

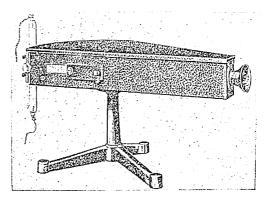
SPECTROSCOPE, spek' tro skohp, an instrument for studying the spectra of bodies to determine their composition (for a full explanation of the term spectrum, see Light). Briefly, the spectrum of a body is the image formed when its light rays are dispersed after passing through a prism. The simplest form of spectroscope is a triangular glass prism, and the method of using it is shown in the diagram accompanying the article Light. In a spectroscope of this sort, the colors overlap. For the purpose of analysis, it is necessary that each color be sharply defined, and this definition is secured by the use of a telescope and other tubes in connection with the prism.

The spectroscope in general use is shown in

the accompanying illustration.

The compound spectroscope used in obtaining spectra of the heavenly bodies consists of a series of prisms arranged in the arc of a circle, so that the spectrum is magnified by each before it is viewed by the observer. These spectroscopes are so constructed that they can be attached to the eyepiece of a large telescope. Astronomers measure distances and velocities of stars by means of the spectroscope. The dark lines appearing in the spectra of glowing bodies move toward one or the other end of the spectrum, according as the body under in-

vestigation is approaching the observer or receding from him. Upon this principle, astronomers have based some of their most remarkable discoveries. Further information will be found in the article Spectrum Analysis.



A SPECTROSCOPE

SPECTRUM. See Color; Light (The Spectrum).

SPECTRUM, DIFFRACTION. See DIFFRACTION.

SPECTRUM ANALYSIS. The effect of passing a beam of sunlight through a glass prism in a dark room is shown in the diagram under Light. The image of rainbow colors formed by this experiment is called the *solar spectrum*, because it is produced most perfectly by sunlight, but it has been found that any glowing substance, such as molten iron or burning hydrogen, will produce a spectrum. Moreover, each substance, if in the gaseous state, forms a spectrum different from that of any other substance; therefore, by studying the spectrum of any substance, we can learn its chemical composition. The term *spectrum analysis* is applied to this sort of study.

A spectrum that shows an unbroken array of colors from red to violet is a continuous spectrum, like that formed by sunlight. The spectrum formed from a single substance, like hydrogen, for instance, or that from a number of gases, is not continuous, but shows bands or lines of color separated by dark spaces, and it is known as a bright-line spectrum. Experiment has shown that, when the light of a glowing substance is passed through the vapor of another substance, this vapor absorbs the colors that appear in the spectrum of the absorbing substance, causing black lines to appear in the spectrum. A spectrum formed in this way is called an absorption spectrum. To illustrate, the interior of the sun is a glowing mass, but when viewed through the spectroscope, the solar spectrum contains a number of dark lines which are caused by gases that surround the heated interior of the sun, and absorb the colors that they produce in the spectrum.

Fraunhofer Lines. The different colors of each substance always appear at the same place in the spectra. Consequently, when a dark line appears in place of the color that a given substance, as sodium, would produce, it proves that the light from the substance under observation is passing through the vapor of so-dium. These dark lines were discovered by Fraunhofer, a Bavarian optician, and in honor of their discoverer were named Fraunhofer lines. The German physicist Kirchhoff concluded that these lines were caused by the presence in the sun's atmosphere of those substances which themselves produce bright lines in the same position on the spectrum. That is, the spectrum revealed the substances of which the sun was composed. Further experiments showed that the earth and many of the stars are composed of the same substances. Concerning the importance of this discovery, the eminent scientist Helmholtz said:

It has excited the admiration and stimulated the fancy of men as hardly any other discovery has done, because it has permitted an insight into worlds that seemed forever veiled to us.

Uses. In addition to its use in astronomy, spectrum analysis is employed in testing minerals for the discovery of new metals, and a number of the rare metallic elements have been discovered in this way. It is also employed in testing the purity of substances, since the minutest quantity of an adulterant can be detected. It is estimated that the spectroscope will detect the presence of as small a quantity as $\frac{1}{24000000}$ of a grain of lithium. This instrument has also aided marvelously in the study of atomic structure.

Related Subjects. The reader is referred in these volumes to the following articles:

Atom Chemistry Color Diffraction Light (The Spectrum) Newton, Sir Isaac Rainbow Spectroscope

SPECULAR IRON. See Hematite. SPECULUM METAL. See Bronze.

SPEECH, the production by the vocal organs of articulate sounds for the purpose of communicating ideas. In a sense, it means the same as language, but, more accurately considered, the latter is the organized body of articulate sounds, while speech is the art of producing those sounds. Besides man, no animal, so far as is known, is capable of anything which may be correctly termed speech, but certain birds may be trained to imitate very closely the sounds produced by the human voice. Just how many sounds and modifica-tions of sounds are used in the speech of mankind is not known, but scholars estimate them at approximately 1,000. Since the vocal organs differ in their formation or development, sounds easy and natural to one body of people may be practically impossible to another, and

few if any languages contain over fifty distinct sounds.

Related Subjects. The reader is referred in these volumes to the following articles:

Consonant Orthography
Languages of the World Vowel

SPEEDOMETER, speed om' e tur, a device used on motor vehicles to indicate mileage. Most speedometers have attachments which indicate the total number of miles traveled, miles per hour, and mileage per trip. The device is usually operated through the action of a revolving magnet driven by a road wheel of the vehicle. Though not required by law, speedometers are almost a necessary part of the equipment of a motor vehicle, since all communities now have speed laws which must be obeyed. The device which registers mileage on a bicycle is called a cyclometer.

A similar instrument is used by surveyors, and is attached to the wheel of a light vehicle, or to a wheel with a shaft or handle by which it is pushed along, each revolution causing clockwork to be set in motion. The number of revolutions is indicated on a dial, and from this, knowing the circumference of the wheel, it is a simple matter for one to calculate the distance covered. See illustration, page 6751.

SPEEDWELL, companion ship to the Mayflower. See Plymouth Colony (The Mayflower).

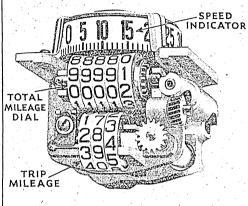
SPEISS, *spise*, Adolph. See Physical Education (Development Through the Centuries).

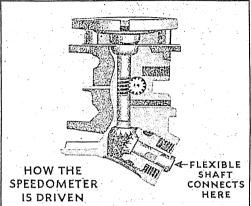
SPEKE, speek, John Hanning (1827-1864), explorer, sportsman, scientist, and discoverer of the source of the Nile. He was born in Somerset, England, entered the Indian infantry at seventeen, and was made a captain in the Crimean War. He explored the Himalayas and made three expeditions into Central Africa. On the second expedition he discovered Victoria Nyanza (nyanza, native word for lake) while his companion, Richard Burton, was ill. In 1862, sponsored by the Royal Geographic Society, he believed he had proved that Victoria Nyanza was the source of the Nile when he found the point at which the river emerges from the lake. Although this proof was discredited by some, after Speke's death more extensive explorations were made which proved the accuracy and importance of Speke's theory. He received many honors and medals.

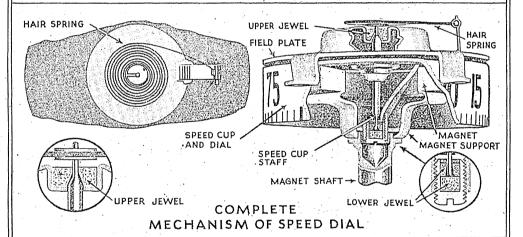
Writings. Speke recorded his experience in What. Led to the Discovery of the Source of the Nile and Journal of the Discovery of the Source of the Nile.

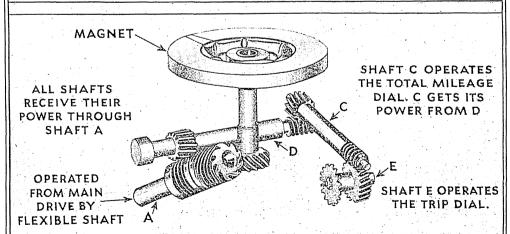
SPELLING. The ability to spell is everywhere taken for granted as one of the fundamental requirements of an education. A man may "have no head" for mathematics; his penmanship may be almost illegible; he may have neglected literature entirely in his love for

IT MEASURES YOUR MILES









science; and yet those with whom he comes in contact may not condemn him as an uneducated person. But if he misspells any of the words in common use in written communication—there are about 1,500 such words—he will be looked upon, by those who know of his failing, as an untrained and illiterate individual. True, such a judgment may be unjust, but it is generally made; and it is this tendency to judge a man's education by his spelling that gives to the subject its importance in school.

This importance has always been recognized, and stress has been laid on the teaching of spelling which is somewhat out of proportion to its real importance in life. But the subject has always presented difficulties to teachers who have wished to make their teaching really vital. It seems to be a mechanical study, requiring practically no skill on the part of the teacher, and furnishing little or no motive to the learner. A pupil formerly studied his spelling lesson doggedly, as a stupid task imposed on him by authority, because it did not appear to touch any of the interests of his life. Even the teacher who was willing to seek far afield for illuminating subject matter-who could make a history or a reading lesson as entertaining as a game—usually found herself baffled by the spelling lesson, when she attempted to make it interesting and appealing to her pupils.

The Change in Method. There has been, however, in recent years, a decided change in the methods of teaching spelling. The old method was comprised in the one word-drill. A list of words, frequently unrelated to one another, was assigned for each lesson; and these words the pupil muttered over to himself until he felt that sheer repetition had engraved them on his memory. The recitation consisted of the writing or spelling aloud of these words; and the teacher sometimes felt that she was imparting a touch of originality when she changed the order of the words, that the pupil might not have the mechanical assistance of an arrangement learned by heart. If pupils could not spell accurately, their parents and even their teachers felt that what was needed was more drill.

Spelling books themselves have changed from lists of words graded according to their supposed difficulty to organized lists of the words most frequently used by children in each grade. Words most often misspelled are given special attention. All of this listing and organization is done on the basis of actual investigations made in schoolrooms, showing the written vocabulary of pupils in each grade, and the difficulty of each word as indicated by the frequency of misspelling.

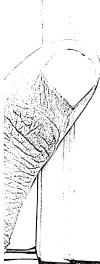
To-day, also, in the assignment of a spelling lesson, the crucial parts of words are pointed out, modes of study are suggested, and devices

are introduced for interesting the pupils in the derivation, meaning, and proper use of words. Then, too, the spelling is kept, so far as possible, within the range of the pupil's interest; he is asked to spell only such words as he feels the need of knowing how to spell-only the words which are in his vocabulary. When it seems desirable to introduce new words, this is accomplished indirectly; the pupil is given the new experience, is then taught the words which describe it, and so is brought to feel, quite naturally, the necessity for learning how to spell the new words. Teachers may supplement the textbook by class lists and by personal lists for each pupil, in which his particular difficulties and progress are studied.

The old drill method often neglected the meanings of words; the present "thought" method lays as much stress on meaning and pronunciation as on spelling. It is not sufficient that a pupil be able to repeat glibly the definition of a new word; he must be able to use it in a sentence in such a way that it admits of no ambiguity. Each word should be made to call up as many associations in the pupils' minds as possible; in fact, spelling should become a real word study, and not a mere letter-by-letter memory of words.

The Spelling Vocabulary. As indicated above, the course in spelling has undergone revision with a view to including only those words that are likely to be used by the individual after he leaves school. Formerly, it was thought that children should be required to learn many words for which they would never have any actual need, because it was believed that, in mastering these words, they would receive good training in memory. This has been shown by psychological experimenters to be a fallacy. One may through training acquire a good memory for words, but at the same time his memory for legal, or geographical, or historical, or psychological, or commercial, or household economic facts and principles may not be improved in the least. There is some reason to conclude that excessive memory work in spelling may weaken, rather than strengthen, memory for facts and principles, in fields unrelated to spelling.

With a view to determining what words the typical American will need in daily life, extensive research work has been done by a number of investigators. Several years ago, Professor William A. Cook of the University of Cincinnati and Professor M. V. O'Shea of the University of Wisconsin set up an investigation for the purpose of learning what words are actually used in the written communication of American people—of course, spelling does not enter into oral communication. These investigators decided to examine a large amount of correspondence between people in different walks of life, who had varied interests, and



who had received varying amounts of school and college education. The correspondence thus examined was written without the knowledge that it was to be studied for the purpose of determining the spelling needs and spelling vocabulary of the correspondents, so that the authors wrote freely and naturally, without any effort either to extend or to limit their usual spelling vocabulary. The investigators tabulated all the words used by all the correspondents, and then reduced them to a dictionary basis which would show what words actually functioned in the written communication of typical American people. Technical writing of specialists was eliminated, because it was not desired to learn what the spelling vocabulary of technicians and specialists should be.

The findings of these two investigators have since been corroborated by extensive research carried on by a number of persons, so that we are able now to say, with a high degree of confidence, what the general spelling vocabulary of the American people, except specialists, should be. Cook and O'Shea arranged in three groups the words which they found in the correspondence which they examined. In the first group, they placed the words which were used by every correspondent. There were 185 of these words, as follows:

about	every	late	ought
after	far	leave	out
afternoon	feel	let	over
again	few	letter	own
all	find	like	part
almost	first	little	pay
also	food	live	people
an	for	long	place
and	four	look	pretty
another	friend	make	put
any	from	man	quite
around	get	many	rest
as	give	me	right
ask	glad	mine	run
at	go	morning	same
away	guess	much	say
back	have	must	see
be	he	my	seven
before	hear	· need	several
boy	help	never	she
build	her	new	show
busy	here	next	six
but	him	шсс	so
by	his	night	some
can	home	no	soon
cannot	hope	not	spend
church	hour	nothing	start
come	house	now	such
course	how	of	suppose
day	if	off	sure
dear	in	old	take
do '	it	on	talk .
down	just	one	tell
enough	keep	only	than
even	know	or	that
ever	last	other	the

their	time	very	which
them	to	visit	while
then	too	want	will
there	town	way	wish
they	train	we	with
thing	try	week	write
this	two	well	year
though	up	what	yesterday
three	us	when	yet
through	use	where	you
	3	our	

The investigators arranged in the second group all words used by a majority of the correspondents who had contributed material for the investigation. There were 577 words in this list, as follows:

able	big	clear	dress
above	bill	clock	drive
accept	birthday	close	drop
account	bite	cloth	dry
across	black	clothe	during
act	blame	coat	dust
add	block	coffee	duty
address	blood	cold	each
advantage	blow	color	early
afraid	blue	comfort	earth
afterward	board	comfortable	eat
against	body	common	effect
age	book	company	eight
ago	both	compare	either
ahead	bottle	concern	electric
air	bottom	condition	eleven
allow	box	continue	else
alone	bread	cook	enclose
along	break	cool	end
already	breakfast	сору	enjoy
always	bring	corn	equal
among	brother	cost	especially
amount	brown	count	everybody
answer	burn	country	everything
anxious	business	couple	examination
anything	butter	cover	except
anyway	buy	crazy	excuse
appreciate	cake	cross	expect
arrive	call	cup	expense
asleep	car	cure	experience
attempt	card	cut	express
attend	care	dance	extra
aunt	careful	dark	eye
automobile	carry	date	face
avenue	case	daughter	fact
awful	catch	dead	fail
awfully	cause	deal	fair
baby	cent	death	fall
bad	certain	decide	family
badly	certainly	degree	fast
bank	chair	die	fat
basket	chance	difference	father
bath	change	different	fear
beat	charge	dinner	fellow
beautiful	cheap	direct	fifteen
because	cheese	disappoint	fifty
become	chicken	dish	fight
bed	child	divide	fill
begin	chop	doctor	fine
believe		dollar	finish
beside	city	door	fire
_	class clean	doubt	fit
between	Clean	doubt	111

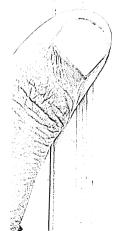
ive	kill	owe	roll
ix	kind	pa	roof
flat	kiss	pack	room
floor	kitchen	package	safe
folk	lady	paint	satisfy
follow	land	paper	save
foot	large	park	scare
forenoon	lately	parlor	school
forget	learn	party	seat
fourth	lesson	pass	second seem
free	library	past	select
front	life light	pen per	sell
full	light line	perhaps	send
fun funny	listen	person	serve
further	lose	. piano	service
game	lot	pick	set
gate	love	picture	settle
gather	lovely	pie	seventy
general	low	piece	sew
girl	lunch	pillow	shall
glass	machine	pin	shop
grade	mail	plan	short
grand	manage	play	sick
great	matter	pleasant	side
green	may	please	sight
grind	maybe	plenty	sign
grip	meal	point	silk
grow	mean	poor	since
hair	meet	porch	sister
half	mention	possible	sit
hall	mighty mile	post postscript	sixty size
hand hang	mind	postscript	skirt
happen	minute	power	sleep
happy	miss	prepare	small
hard	moment	present	smoke
hardly	money	price	snow
hat	month	probably	something
hate	mother	professor	sometime
head	move	promise	son
health	music	pull	sore
heart	myself	quarter	sorry
heat	name	question	sort
heavy	nature	quick	sound
herself	near	quiet	south
high	nearly	quit	speak
himself	necessary	rain	special
hold	neck	raise	spell
hole horse	neither nerve	rather reach	spoil
hot	nine	read	spot spring
hotel	noise	ready	stair
however	none	real	stand
hurry	noon	realize	state
hurt	north	really	stay
idea	note	reason	step
imagine	notice	receive	stick
impossible	number	red	still
improve	o'clock	regard	stock
inside	offer	remain	stop
insist	office	remember	store
instead	often	rent	story
intend	of	report	stove
interest	once	request	street
into	open	return	strike
invite	order	rich	strong
iron	otherwise	ride	student
job join	our	ring	study
join kid	ourselves outside	road rock	stuff
a.i.u	outside	1005	style

success	thicket	until	whole	
suggest	tight	upon	why	
suit	till	usual	wife	
summer	tire	vacation	win	
sun	together	view	wind	
supper	tomorrow	waist	window	
surprise	top	wait	winter	
sweet	treat	walk	without	
table	tree	wall	woman	
taste	trip	warm	wonder	
teach	trouble	wash	wonderful	
teacher	trunk	waste	word	
ten	turn	watch	work	
terrible	twelve	water	world	
thank	twenty	wear	worry	
thick	twice	weather	worth	
thin	uncle	west	wrong	
third	under	whatever	yard	
thirty	understand	whether	yellow	
thoroughly	university	white	yes	
throw	unless	who	young	
yourself				

In the third list, the investigators placed 2,207 words used by some, but by less than a majority, of the correspondents. On account of lack of space, it will not be possible to reproduce this last list, but any reader who is interested can consult Cook and O'Shea's The Child and His Spelling, pages 173-219.

In addition to these lists, others including proper names were prepared. But most of these were of a local and personal character, such as the names of particular persons, and of towns, cities, and states, of days of the week, and of months of the year in which the letters were written. It will not be necessary to reproduce the lists of proper names here, although it may be added that the investigators referred to advised that pupils, before leaving the elementary school, should be able to spell the days of the week, the months of the year, and probably the countries of the world and the states of the American Union.

Every pupil's spelling vocabulary, then, should include the words in the first two lists, because they will undoubtedly be needed by most persons in the written intercourse of daily life. Further, in building a bridge, an engineer always provides for a "margin of safety," and he constructs his bridge so that it will bear two or three times the load that he expects it will ever be required to support. So, in learning to spell, one should provide for a "margin of safety," which means that one should probably learn most, if not all, the words in the third list, which Cook and O'Shea found to be used by some, but not by a majority, of the correspondents whose writings were examined. In addition, one should prepare for a possible time of need by learning a few new words that are just coming into general use, such as, "stenotype," "television," and "photophone." One cannot tell at any moment what new word will be retained in the language and become so popular that it will



need to be used by everyone in touch with current affairs. But in America, where everything is plastic and new developments are appearing every day, it is certain that new terms will be constantly coming into the language and circulating freely in written intercourse.

The Use of Rules. In arithmetic, almost everything can be reduced to rule; in spelling, comparatively few rules are possible, and these are no longer taught at the outset, as under the old method. Only when the pupils have mastered enough individual cases to make gener-

alization seem reasonable are the rules introduced. When such derivatives as plan, planning; compel, compelling; run, running, have been mastered, the rule that "monosyllables and words accented on the last syllable, ending in a single consonant preceded by a single vowel, double the final consonant before a suffix beginning with a vowel" may be introduced naturally. All other rules, many of them cumbersome, are to be mastered, if at all, in about the same manner; they must follow and not precede their illustrations. See, also, the article PHONETICS.

Simplified Spelling

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As stated in the article Phonetics, the ideal language would be one in which every letter had but one sound, and every sound was represented by a letter. In such a language, each word would be spelled exactly as it sounds, and spelling would be a very simple matter, once the principles of phonetics were mastered. No speech in the world to-day attains this ideal, and English comes very far short of it. One has but to consider the pronunciation of tough, sough, though, and through, to be convinced of this fact.

Many scholars in England and America have from time to time voiced their dissatisfaction with the chaotic state of English spelling, and have attempted to set on foot movements for so-called spelling reform, or simplified spelling. They have always, however, met with determined opposition, both from those who are naturally conservative, and from those who believe that the confusion resulting from any extensive change would be worse than the disadvantages of the present spelling.

In 1886 the American Philological Association and the British Philological Society published a list of 3,500 words, spelled according to a list of rules for simplification announced several years before. Some of these have come into common use since that time, while others are still far from being accepted for general The National Education Association of the United States adopted in 1898 the following "reform" spelling, for use in its publications:

thorofare program demagog altho tho thru pedagog catalog thoro thruout prolog decalog

In 1906 there was organized in New York the Simplified Spelling Board, which was endowed by Andrew Carnegie and headed by Brander Matthews. Its simplifications were somewhat more sweeping, and were included under sixtyone rules, or recommendations. The Board recommended, for instance, such changes as the following:

1. The use of e instead of the diagraph ae, except at the end of a word; thus, medieval for mediaeval; ether for aether.

2. The omission of the silent b before t; thus, dout for doubt; dettor for debtor.

3. The use of e instead of ea, in words having the short e sound: hed for head; helth for health.

4. The dropping of final gh' when it is silent; as, thru for through; the for though; and the substitution of f in such words as laf for laugh or tuf for tough.

5. The substitution of er for re in such words as

theater, meter, or scepter.

6. The omission of silent g and silent k before n; thus, nat for gnat; naw for gnaw; nock for knock; nife for knife.

7. The substitution of f for ph pronounced like f; thus, fantom for phantom; sfere for sphere; trofy for

A complete list of these rules cannot well be given here, but a study of the above examples will show that some of the simplified forms have already made considerable headway. Medieval, for instance, no longer looks strange; theater is commonly used; and even tho has come to seem fairly familiar.

In August, 1906, President Roosevelt issued an order that reformed spelling of a list of 300 words affected by the rules of the Simplified Spelling Board should be used in government publications. This provoked so much protest that the order was withdrawn. The movement has made slow progress in recent years, although certain of the less radical changes have come into general use, and some newspapers and magazines have adopted a definite style of simplification in the spelling of common words.

Judging by the progress of the spellingreform movement in the past, it seems likely that any lasting and important changes in the future will be accomplished slowly, through m.v.o's. public usage.

SPELMAN FUND OF NEW YORK. See EDUCATIONAL FOUNDATIONS.

SPELT. See WHEAT (Varieties).

SPELTER. See ZINC.

SPELTER SOLDER. See Brass.

SPENCER, ANNA GARLIN. See WOMEN, GREAT AMERICAN (Adult Educators).

SPENCER, spen' sur, HERBERT (1820-1903), an English philosopher, was born at Derby. Because of his delicate health in childhood, the boy's early education was supervised by his father, whose ideas were far in advance of the age. From 1837 to 1846, the young man was in the employ of the London & Birmingham Railway; subsequently, until 1853, he served as subeditor of the *Economist*. This position

gave him wide opportunity for studying and writing, and for acquaintanceship with the brilliant people of the period, among them being George Eliot, George Henry Lewes, and John Stuart Mill.

While working on his Psychology, which appeared in 1855, Spencer undermined his health, and suffered for the rest of his life from chronic insomnia and dys-



HERBERT SPENCER

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pepsia. The great scheme of his life was the proposed publication of a complete system of philosophy, in which he aimed to outline "in a sweeping, general formula the belief in progress which pervaded his age, and to erect it into the supreme law of the universe as a whole." A complete list of the titles of this *Synthetic*

Philosophy, as well as all of his writings, concludes this article.

Spencer's philosophy is chiefly occupied with defining the fields of the knowable and the unknowable. He made neither clear nor definite his expressions regarding the latter, to which, as he found, belong The Absolute, The Infinite, Space, Matter, Time, Force, and Motion. What he aimed to establish was that the very fact that we cannot solve ultimate metaphysical questions compels us to admit the existence of some supreme power behind the unknowable phenomena.

His great contribution to science lay on the positive side, where he dealt with the knowable, and aimed to reduce its laws to unity. The idea of evolution he applied, first, to all forms of organic life, and then to social and political institutions. He declared knewledge is gained by twofold experience, that of the individual and that of the race; inherited intellectual tendencies, therefore, are an important determining factor. The prevailing law which governs the phenomena of nature is the persistence of force: there is continuous order in all things, and a prevalent suggestion of a common origin. Hence, despite his protests, he became a materialist, explaining everything by materialism. He declared all forms of phenomena to be the result of a passing from the simple to the complex. He explained the universe as a gradual development, instead of accepting the doctrine of creationism (catastrophal or accidental development), often seeming to fail to realize that evolution may be the history of origin, but that it can never be its explanation.

Evolution is his ultimate law of nature, counteracted by one other force, that of dissolution; whether or not there is progress depends on the relative strength of the former. The same formulas that apply to the inorganic world he also applied in explanation of the relations of all phenomena in the organic, the political, the social, and the ethical worlds. Thus he combined with his idea of the persistence of force that of natural selection and adjustment to environment (see Evolution).

Spencer stands as the great representative of the scientific movement of the last part of the nineteenth century. Many of his theories have been disproved by more recent investigations of specialists, but his masterly attempt to satisfy the need of a comprehensive survey of the world as a whole, in terms of facts rather than abstractions, won for him high rank among the great thinkers of all ages.

His Great Works. To Spencer's Synthetic Philosophy belong the following volumes: First Principles, The Principles of Biology, The Principles of Sociology, and The Principles of Ethics. His other works include Essays: Scientific, Political, and Speculative; Social Statics; The Study of Sociology; Education: Intellectual, Moral, Physical; Various Fragments; The Inadequacy of Natural Selection; Descriptive Sociology; and his Autobiography, published in 1904.

SPENSER, EDMUND (about 1552-1599), a great English poet of the Elizabethan Age, born at East Smithfield, London. He was sent to the Merchant Taylors' School, then became a student at Pembroke Hall, Cambridge, and in 1576 received from the university the de-

gree of M. A. Two years later, he was taken into the household of the Earl of Leicester, and in 1579 published his Shepheardes Calender. This was dedicated to Sir Philip Sidney, who introduced the young poet in court. The next year, Spenser was made undersecretary to the lordlieutenant of Ireland, and took part in restoring peace in that



Photo: Brown Bro

EDMUND SPENSER

country, at the time of Desmond's rebellion. After the year 1586, he lived in Kilcolman Castle in Cork, as possessor of a large estate given him by the government. Here he continued the writing of the Faerie Queene, begun

several years before, and, upon the advice of Sir Walter Raleigh, who visited him in 1589, submitted the manuscript at court. The only encouragement given him was a meager pension, and his *Colin Clout's Come Home Againe* shows his chagrin at his defeat. However, he published the first three books of his allegory in 1590, and they were eagerly received by the public. Somewhat later *Complaints* appeared.

After his return to Ireland, Spenser married a lady whose given name, Elizabeth, alone is known. The courtship was described in the Amoretti, a series of sonnets, and the marriage was made memorable by the Epithalamion, the finest of English wedding songs. In 1596 more books of the Faerie Queene appeared, as well as Foure Hymnes and the fine Prothalamion. At this time, too, was written the Present State of Ireland, not published for many years. These productions, however, did not advance him at court, and he returned from another visit to England more discouraged than ever. Two years later, his castle was broken into and burned by Irish rebels, and he narrowly escaped with his family. Not long afterward, he died in a London inn.

The Faerie Queene, though not completed, ranks among the greatest narrative poems in the literature of the world. It was the author's intention to make the allegory consist of twelve books, in which twelve moral qualities should be embodied in as many knights, representing chief personages of the day, as Raleigh and Drake. However, only six books, and two cantos of Mutabilitie, were written. The form of stanza Spenser used has since been given his name (see Spenserian Stanza). The music of the verse, the beauty of sentiment, and, above all, the exquisite fancies called into being by a wonderful imagination, are the chief merits of the Faerie Queene, which has so profoundly impressed many of the later great poets that Spenser is called by some "the poet's poet."

SPENSERIAN STANZA, a verse form originated by Spenser for his Faerie Queene. It is a nine-line stanza, the first eight lines containing five feet each, the last six feet, while the rhyme scheme is ababbcbcc. It is a very stately form of verse, and while many English poets have attempted to imitate it, few have known how to handle it in a manner worthy of its inventor. Among famous poems written in Spenserian stanza are Keats' Eve of Saint Agnes and Byron's Childe Harold.

SPERMACETI, spur ma se' till, a waxy substance obtained from cavities in the head and from the blubber of the sperm whale. Spermaceti of the best quality is found in the thick, oily head fluid. By a process of trying out and cooling, this fluid is separated into sperm oil and a mass of flaky white crystals. The latter constitute the spermaceti of commerce. An

ordinary whale yields about twelve barrels of the raw material. When purified, spermaceti is a smooth, translucent solid, practically tasteless and odorless, and similar to tallow in appearance. It can be dissolved in hot alcohol and ether, and burns with a bright flame. Formerly employed in making candles and to give weight to dress goods, it is now valued chiefly as an ingredient of ointments and cosmetics. See Whale; Wax.

SPERMATOPHYTES, spur' ma toh fites. See BOTANY (Classification).

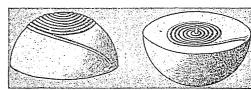
SPERRY, ELMER AMBROSE (1860-1930), American engineer and inventor, was born at Cortland, N. Y., and studied at the State Normal and Training School and at Cornell University. He was famed for his practical application of scientific laws, as in his gyro-compass, invaluable in modern sea equipment, his automatic steerer, and his airplane and ship stabilizers. He founded the American Institute of Electrical Engineers and the American Electro-Chemical Society. See Gyroscope.

SPHALERITE, sfal' ur ite. See Zinc. SPHENOID, sfe' noid, BONE, one of the eight bones in the head (which see).

THE THE THE THE TANK OF THE TRANSPORT OF

SPHERE, sfeer. A curved surface, all points of which are equally distant from a point within, is called a sphere. The point within from which all points of the surface are equally distant is called the center. The distance from the center to the surface is the radius. The distance from any point on the surface through the center to the opposite point on the surface is the diameter.

Surface of Sphere. Cut a sphere into two equal parts. Wind a cord about the whole convex surface of one of the hemispheres; then



[Explanation appears in text.]

wind this same cord about the entire plane surface or base of the hemisphere (which is a great circle of the sphere). You will find that the cord which covers the convex surface will cover the great circle twice. Stated as a rule, this is expressed: The area of a sphere is equal to the area of four of its great circles. The area of a circle equals 3.1416, or π (pi), times the square of its radius (see Circle). Therefore the surface of any sphere $=4\times\pi\times \text{radius}^2$.

What is the surface of a sphere whose diameter is $\mathbf{x} \mathbf{z}$ feet?

Surface in sq. ft. = $4 \times 3.1416 \times 6^2 = 452.3904$.

Volume of Sphere. Take a cylinder of the same diameter as a sphere, and of an altitude

equal to the diameter of the sphere. (1) Fill the cylinder with water, and in it place the sphere; hold the sphere firmly so that it rests on the base of the cylinder (does not float), and thus displaces its own volume of water. When the sphere is taken out, the cylinder is found to be one-third full of water, which shows that the volume of the sphere is twothirds of the volume of the cylinder.

(2) Place the sphere in the empty cylinder; fill in with salt, sugar, or sand; take out the sphere, and find that the salt, sugar, or sand fills the cylinder to one third of its height.

(3) The two solids may be made of clay or putty and weighed, and the relative weights

All these experiments show that the volume of a sphere is two thirds the volume of a cylinder whose diameter and whose height are each equal to the diameter of the sphere.

Volume of any cylinder = area of base × height Volume of cylinder = $\pi \times r^2 \times \text{height}$

But in this cylinder, the height is equal to diameter, or twice the radius (see Cylinder).

 $Volume = \pi \times r^2 \times 2r$ $Volume = 2 \times \pi \times r^3$ and

Volume of sphere = $3/3 \times (2 \times \pi \times r^3)$ Volume of sphere $= \frac{4}{3} \times \pi \times r^3$ Volume of sphere = $\frac{4}{3}\pi r^3$

Find the weight of a steel ball 20 inches in diameter, steel weighing 480 pounds to the cubic foot.

Volume of sphere=4/3πr³ Weight in lb. = $\frac{4 \times 3.1416 \times 10^{3} \times 480}{100} = 116356$ 3×1728

The surfaces of spheres are to each other as the squares of their radii. The volumes of spheres are to each other as the cubes of their radii or the cubes of their diameters. The volume of a sphere is, roughly, one half the volume of a cube whose edge is equal to the diameter of the sphere. J.W.Y.

SPHERICAL ABERRATION, sfehr' ih kal ab ur a' shun. See ABERRATION.

SPHEROID, sfe' roid, a geometrical body resembling a sphere, but not perfectly round. In geometry a spheroid is a figure generated by an ellipse revolving about one of its axes. The spheroid is called *prolate*, or *oblong*, when it revolves about the longer, or major, axis of the generating ellipse; when it revolves about its shorter, or minor, axis, it is said to be oblate. The figure of the earth is frequently referred to as an oblate spheroid, as its polar diameter is slightly shorter than its equatorial diameter (see Earth).

SPHINX, sfingks. In Grecian mythology, the sphinx was a wicked being usually represented as a lion, having the head of a woman, the tail of a serpent, and the wings of a bird. This creature lived in a cliff just outside the city of Thebes, and kept guard over the road to the

city. To every passer-by she put this riddle: What animal is it that walks on four legs in the morning, two at noon, and three in the evening? And anyone who failed to answer correctly was immediately devoured. Oedipus passed on the way to Thebes, the riddle was put to him, and, without much hesitation, he declared the animal to be man, who walked on his hands and feet when young, erect on his two feet in middle life, and with the aid of a staff in old age. With a howl of rage because her riddle had been read aright, the sphinx hurled herself from the rocks and was killed.

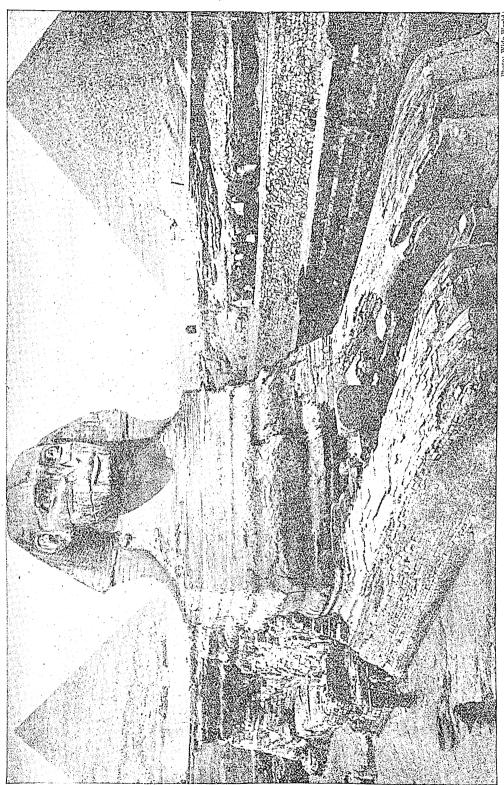
The Egyptian Sphinx. This mythical creature was not quite like the Grecian, but had the head of a man and the body, legs, feet, and tail of a lion. It had no wings until a later period, when the Greek influence was felt. Originally, the sphinx was supposed to represent the god Horus, guardian of temples and tombs; and when sculptured the face was probably made to resemble the Pharaoh who ruled at that time. Sometimes sphinxes lined both sides of an avenue leading to a temple, as at

Karnak. See illustration, page 832.

The Great Sphinx, a marvelous reminder of Egypt of old, stands close to the Great Pyramid at Gizeh; it is one of the most impressive monuments in Egypt, and is carved out of solid rock, excepting the paws, which are built of masonry. It was the custom to execute royal portraits in the heads of sphinxes, and it is believed that the Great Sphinx bears the features of the Pharaoh who built it. The great figure is 172 feet long and sixty-six feet high, its head is thirty feet in length, and the width of its face is fourteen feet. These figures give some idea of its enormous size, but it is impossible to convey any idea of the expressiveness of its scarred features. The Arabs mutilated the face shamefully, using the head as a target for their guns. The age of the Sphinx is unknown, but it is considered well established that it was in existence at the time of Cheops, and was repaired by him about 2900 B.C.

The sands of the desert are continually burying the base of the monument, and only through excavations, made at great intervals, have the huge paws and body of the beast been made visible. In 1926 the sands which for 3,000 years had been accumulating and hiding the lower part were cleared away, and repair work was completed which revealed this ancient monument in new and greater glory. Thothmes IV had been the last to remove the sand. At the same time, he had made a few additions and repairs, and painted all but the head in red. Remnants of his work and the paint were found in the excavations. A.E.R.B.

SPHINX MOTH. See HAWK MOTH. SPICA, spi' kah, a star. See Astronomy (The Heavens in Spring).



The Great Sphinx, After Its Feet Were Uncovered in 1926. Before the excavation, the desert sands had buried not only the gigantic feet, but also the upright portion, as high as the dark line across the figure which appears above the considerable black space. (See page 6758.) 6759

SPICE, the general name for a group of pungent and aromatic vegetable products, used chiefly to season foods. The various spices, such as pepper, nutmeg, cloves, ginger, allspice, mace, mustard, cinnamon, and capsicum, are derived from different parts of plants; for example, cloves are procured from the bud, cinnamon from the bark, pepper and nutmeg from the fruit, ginger from the root, and mustard from the seed. The food value of spices arises not from their nutritive content, for their percentage of nourishment is small, but from the stimulating effect they have on the digestive organs. They should, however, be used with moderation, as excessive use of any seasoning is injurious. The cultivation of spice plants is an important industry in many tropical coun-

Related Subjects. The following spices are described in these volumes:

Allspice Caraway Coriander Mustard Nutmeg Anise Cardamom Cubebs Paprika Cinnamon Ginger Caper Pepper Capsicum Cloves Mace

SPICE ISLANDS. Because of their production of spices, this name is often applied to the Moluccas (which see).

SPICES, ADULTERATION OF. See ADULTERATION OF FOODSTUFFS AND CLOTHING (Flavoring Extracts and Spices).

SPICULE, spik' yule. See Sponge.

SPIDER, one of a group of animals that are of special interest because of their ability to spin beautiful silken webs. The purpose to which some of these dainty gauze structures are put is known to every child who has learned the poem beginning—

"Will you walk into my parlor?" said the spider to the fly.

"'Tis the prettiest little parlor that ever you did spy; The way into my parlor is up a winding stair,

And I have many curious things to show when you are there."

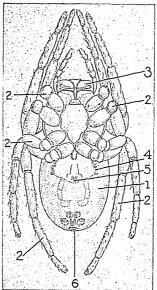
"Oh, no, no," said the little fly, "to ask me is in vain,
For who goes up your winding stair can ne'er come
down again."

Many an insect, however, is not so wary as the fly of the poem, and meets its death in the silken meshes.

General Description. The spider itself is not an insect, though zoölogists at one time included it among the Insecta. According to modern classification, spiders belong to a class called Arachnida (which see), to which belong also mites, ticks, and scorpions. Arachnids have two body divisions—a forepart consisting of a united head and thorax, and an abdomen. In case of the spider, the two parts are connected by a slender, flexible stalk. Insects have three body divisions and four wings. Spiders have no wings.

Another point of difference is the number of legs. Insects have three pairs, while spiders and nearly all other arachnids have four. The

long, thin legs of a spider have seven joints, and they end in tiny claws. In some species, the legs are so arranged that the animal can move in any direction—forward, backward, and sidewise. There are two other pairs of appendages. These are in the nature of jaws, or



EXTERNAL VIEW OF UNDERSIDE OF SPIDER

1. Abdomen

2. Four pairs of legs

3. Mandible

4. Opening to breathing organ

5. Opening to reproductive organs

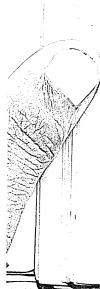
6. End of alimentary canal

mandibles. first pair end in pointed fangs, from which is ejected a poisonous secretion. used in killing the spider's prey. So small an amount is ejected that a human being bitten by a spider usually suffers no more discomfort than from a mosquito bite. The second pair of jaws is used in grasping and holding the vic-

Most spiders have eight eyes, borne on the front of the head. Antennae, or feelers, are lacking. The breathing organs consist of two sacs, each containing several thin tissues arbook; slits on the open into these

ranged like the leaves of a book; slits on the under side of the abdomen open into these sacs. There are three pairs of spinnerets, small tubes borne on the end of the body. From these is exuded a sticky liquid secreted by glands in the abdomen. This substance forms the silky threads of the web. The mouth is simple, as spiders feed on blood sucked from other animals.

The Weaving of the Web. The spider does most of its spinning at night or in the early morning. It raises its spinnerets in the air, and, by gently pressing them against some object, causes the liquid silk to flow out. The threads harden when they come in contact with the air, and unite into one strand. With this thread, the spider makes a suspension bridge, tightening it with its claws and firmly cementing it to a beam, leaf, or wall. On several of these strands is hung the gossamer net, which is of various shapes. The web of the common house spider consists of a number of crisscross strands woven around the supporting spokes and forming an irregular wall around a central space. When any part of the web is broken





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Development of the Garden Spider. (1) The egg sac in early September. (2) The sac exposed to interior view. (3) Eggs exposed to view. (4) Shows how the mouth is closed with an ingenious stopper. (5) The silky underside of the stopper. (6) Eggs with silk removed. (7-8) Baby spiders; they remain in the sac until spring. 6761

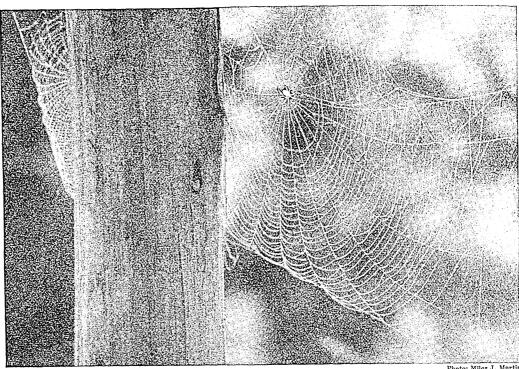


Photo: Miles J. Marti

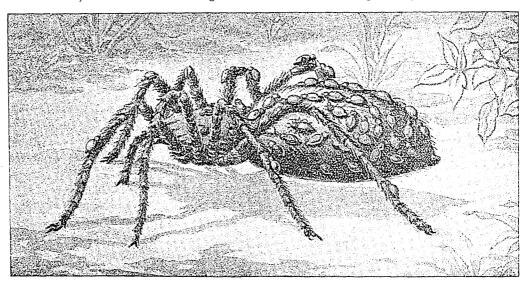
A PERFECT WEB AND ITS WATCHFUL OCCUPANT

The spider requires not more than half an hour to spin the geometrically patterned fabric which serves it as a refuge and as a snare for food. Finer than the finest hair and comparatively stronger than steel, the strands of the spider's web are capable of enmeshing insects much larger than the voracious builder.

the spider immediately makes repairs, but after it has spun several webs, its stock of silky fluid is for a time exhausted, and it often takes possession of the home of some other spider.

Of all the wonderful structures made by the lower animals, the orb web of the large black

and yellow garden spider is one of the most delicately designed and skilfully made. This geometric web consists of delicate spiral strands fastened to spokes arranged like those of a wheel, and is fixed to a branch or leaf with threads resembling the ropes of a tent. The



HOW A MOTHER SPIDER CARRIES HER YOUNG This interesting illustration is of the family of the wolf spider (Lycosidae)

net is hung vertically, that flying insects may hit against it and be entrapped. The spider is never entangled in its own web, because it runs on the radiating strands, or spokes; the sticky, spiral threads are covered with minute, pearl-like drops of the glutinous substance, to hold the captive insect firmly.

The delicate, filmy dome is another vertical web of the field and garden, and is suspended with the opening at the lower side. The single,

shining threads which are often hung from grass stalk to grass stalk are spun by the young spiders. Sending out a thread of silk into the air, they float off with the breeze, and, spinning more thread as they go, they are blown to new fields. The flying, or ballooning, spiders, thus sailing through the air, have been found in midocean; it is in this way that spiders are distributed over the globe.

Habits and Characteristics. There are numercome in search of nectar. The interesting water spiders build a water-tight, silken nest in the water, and inflate it by bringing down to it bubbles of air carried in the hairs on the body. Hunting spiders do not spin webs, but catch their prey by pouncing on it. To this group belong the tarantulas and trap-door spiders. The black widow, which is common in the Southern United States, is the most poisonous American spider.

Spiders reproduce by eggs. The female, which is usually much larger than the male, makes a dainty silken cocoon for her eggs, which sometimes number many hundred. These egg cases are usually attached to the end of the mother's body. It often happens that the males are attacked and killed by their larger mates. It is usually the female that spins the web and obtains the food supply. Spider silk could be made commercially profitable for use in the

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THE GARDEN SPIDER

(1) A good view of the yellow-marked garden spider. (2) A victim enmeshed in his web. (3) Leaping upon his prey.

ous species of spiders, found all over the world, and differing considerably in habit. The largest, found in the tropical regions of South America, are two or three inches long. These creatures prey not only on insects, but on humming birds. Another interesting species is the trapdoor spider, which makes a silk-lined burrow in the ground, and covers the entrance with a lid made of silk, leaves, and soil. The crab spider, so called because it can move backward, assumes the color of the flower on which it lives, and hides in the heart of the blossom, waiting there for the unwary insect which will

textile industry, if enough could be obtained. This is not possible, because any number of spiders placed together in an enclosure would eat each other up. These creatures are among the most shameless cannibals in the entire animal kingdom. Spiders themselves are preyed on by other creatures, but the wasps are their worst enemies. These kill large numbers of spiders, sealing them up in their cells for their young to feed on.

S.H.S.

Legends of the Spider. There are many interesting stories and superstitions surrounding the spider. The lesson the patient spider taught Robert Bruce of Scotland (see his biography in these volumes) is well known.

The old superstition that a fever could be cured by wearing a spider in a nutshell fastened around the neck is mentioned by Longfellow in the tale of Evangeline.

The Arachne Myth. There is a pretty Greek myth explaining the spider's origin. It tells of a beautiful maiden, called Arachne, who boasted of her spinning

and was punished for her pride by the jealous goddess Minerva, who changed her into a spider.

Scientific Names. Spiders constitute the order Arancida within the Arachnida. This order is divided into several families, including Aviculariidae, the trapdoor spiders; Epciridae, roundweb spiders; and Thomisidae, the crab spiders.

Related Subjects. The reader is referred in these volumes to the following articles:

> Antennae Arachne Arachnida Mythology Tarantula Wasp

turies, and the ointment was used by the Romans in connection with the bath.

In Southern Canada and the Northern United States is found an aromatic herb which is used in making a tonic. This is called American spikenard, or Indian root; it is a member of the ginseng family.

Scientific Names. The Oriental plant which pro-

duces spikenard belongs to the family Valcrianaceae. Its botanical name is Nardostachys jatamansi. The American species mentioned above belongs to the family Araliaceae. Its botanical name is Aralia racemosa.

SPINACH, spin' aje, or spin'cultivated for its Though cooked

ech, a popular garden vegetable leaves, which are cooked as greens and are also used in making soup. spinach is nearly nine-tenths water and has only small proportions of protein, fat, and

carbohydrates, it is rich in iron and contains vitamins (which see), both constituents having an important bearing on health. Spinach is also strongly

laxative, for it has a large amount of cellulose, or roughage. It is one of the best vegetables for children, and may be had during the entire winter, for the plant is hardy and can be grown during cold months. In the vicinity of Norfolk, Va., a tender, delicately flavored variety known as Norfolk Savoy is grown in large quantities for the Northern markets. Sowings are made in the fall, and the crop is harvested at intervals dur-

ing the cold weather. Farther north the plant is grown as an early spring crop. Spinach requires a rich soil, as plants grown in poor soil bear leaves that are tough and bitter. The seed is usually sown in drills an inch deep and a foot apart.



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SPIDER BALLS

The eggs are seen on the stems of dead leaves.

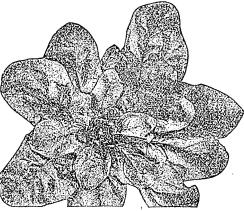
SPIDER WEB, a structure spun

by the spider to ensnare its enemy and protect its home. It is described in detail in the article

SPIEGELEISEN, spe' gel i zen. See Man-GANESE.

SPIKENARD, OR NARD, a costly perfume yielded by a plant of the valerian family, native to India. The root of the plant, which is shaped like a spike, or ear, of corn, bears at the top a cluster of thick stems about two inches long, and it is this part that is principally collected for the extraction of perfume. The precious ointment of spikenard mentioned in the

Bible (see Mark XIV, 3-5, John XII, 3-5) was probably an oil or fat scented with the perfume. The odor of spikenard is not especially agreeable to people of Western countries, but those of the Orient have prized the perfume for cen-



There are two general classes: prickly spinach, with arrowheaded leaves and a fruit pod covered with spines; and smooth spinach, with round leaves and smooth fruit. The most careful washing is necessary in preparing spinach for the table, since the leaves are always full of sand and grit.

B.M.D.

Scientific Name. Spinach belongs to the family Chenopodiaceae. Its botanical name is Spinacia oleracea.

SPINAL CORD, the largest nerve trunk in the body. It is located in the spinal column,

extends from the base of the brain to the lumbar vertebrae, and is composed of gray and white matter. Separating the spinal cord from the bony spinal column are three protective membranes continuous with those which surround the brain (see Brain). liquid known as the spinal fluid is contained in a cavity between these membranes. Inflammation of the membranes is known as meningitis. It is a very serious condition, and is, unfortunately, not uncommon. Examination of the spinal fluid gives information as to the condition of the The membranes.

spinal nerves branch off from it. For a full description, see Nervous System (Spinal Cord).

K.A.E.

SPINAL NERVES. See Nervous System. SPINIFEX, spin' ih feks. See Australia (Plant Life).

SPINNING, an ancient household industry that has found its way into great modern factories. It is a process of making threads by twisting vegetable or animal fibers, and was originally accomplished by means of a spindle and distaff. The spindle was a stick from nine to fifteen inches long, tapering at both ends, and having a notch at one end for catching the thread; the distaff was a staff upon which the fibers were bound in a loose coil. The spinner rotated the spindle by rolling it against the thigh with the right hand, while

the fibers were gathered and arranged with the left. With such a primitive device, the ancient Egyptians made threads that were woven into fabrics of the finest quality. Toward the middle of the sixteenth century, the progress of spinning was aided by the invention of a spinning wheel (see illustration). This was the type of spinning machine, used by the housewives of New England in colonial days, which appears so often in picture and story.

Spinning, however, was destined to undergo a complete revolution. This was the result of

three notable inventions of the eighteenth century-the spinning jenny of James Hargreaves, the cotton-spinning machine of Richard Arkwright, and the mule spinner of Samuel Crompton. Though numerous improvements were perfected during the nineteenth century, which vastly increased the output and made possible a product of higher quality, all modern machinery is based on eighteenth-century models.

Cotton-spinning as carried on in a modern factory may be taken as a After the type. raw cotton has been cleaned and arranged into laps of uniform size, it is carried to the carding machines, equipped with huge rollers covered with wire teeth, where the tangled fibers are straightened out and made to lie in straight, even rows. Then the fibers are rolled over and over one another to form slivers, which look like loose ropes of soft cotton yarn. A sliver goes through the processes of drawing, slubbing, and roving, by which it is twisted and retwisted and made continually finer and The concluding operations are carried out in the spinning machines, in which the

ness, and strength. See COTTON.
Spinning Wheel. This was the first mechanical arrangement for applying a rotary motion to a spindle, for spinning cotton or flax into threads. The principle was the same as that of

thread is finally given the required twist, firm-



A GERMAN WOMAN AT HER SPINNING WHEEL

the spindle used by hand, but when the spindle was mounted horizontally, and a band or small belt was passed from a groove in the spindle over a large wheel, turning the wheel by the foot gave the spindle a more uniform motion.

The material to be spun was carried on a distaff. The wheel was turned with the left hand or foot, the material being drawn out by the right hand. The degree of fineness depended on the rapidity with which the twisting thread was drawn out. For very fine thread, two spinnings were necessary. Before the development of cloth-making in factories, the spinning wheel was as common in the home as the sewing machine is to-day.

Spinning Jenny, a device invented about 1764 by James Hargreaves, of Lancashire, England, by which sixteen or more threads could be spun simultaneously (see Hargreaves, James). The name jenny is derived from gin, which was the local term for engine. In the spinning jenny, spindles were placed vertically and were rotated by a wheel worked by hand. It was found very serviceable for spinning coarse thread, but not for fine work. The jenny was replaced by the mule, which retained most of the important features. See Industrial Revolution; Crompton, Samuel.

SPINOZA, spih no' zah, BARUCH [BENEDICT] (1632-1677), a Dutch-Jewish philosopher, born in Amsterdam. His parents had fled from Catholic persecution in Portugal, and in the Netherlands he received careful instruction in Jewish theology. Under the influence of the philosophy of Descartes and Giordano Bruno, he broke with the Jewish faith, and his heretical views brought about his excommunication in 1656. In his insistence on maintaining a position granting absolute freedom of thought, he lived in solitude at The Hague, depending for a living on the profits from lens-making, in which he was proficient, and declining both the position of professorship at the University of Heidelberg and the pension offered him by Louis XIV of France. His life was lonely, cheered only occasionally by the companionship of a few friends. Gentle, sensitive, heroic, with constitution weakened by consumption, he lived a life of seclusion and, in contemplation of God and spiritual realities, tried to make vital and real the philosophy he taught.

His philosophy was derived from that of Descartes, and developed into a complicated pantheism. It declared that God exists, and that His manifestations, or attributes, are two: extension (that is, the world of material things) and thought. It denied any causal relation between mind and matter, and so he had to apply a theory of parallelism to explain what was apparently interaction between the two. For every idea there is a physical object; for every material thing a corresponding particular idea. Though the physical and ideational

causal series never interact, both are dependent on God, the Substance and Creator. Man is not free: God alone is free. That is, man is a limited manifestation of God, and God alone is Cause, Effect, and Purpose. Man's attention must be riveted on the spiritual, for whenever particulars blind him and remain his ideal, harm and evil result.

His conception of God, wholly different from the Christian one, laid him open to charges of atheism. As he developed it into a philosophy, it can better be described as an elaborate abstract monotheism.

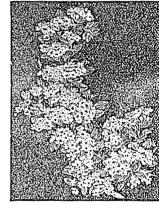
Related Subjects. The reader is referred in these volumes to the following articles:

Atheism Pantheism Descartes, René Philosophy

SPIRACLES, spir' a k'lz. See Insect (Internal Structure).

SPIRAEA, spi re' ah, a genus of herbs and shrubs belonging to the rose family, widely distributed throughout temperate and cold regions of the northern hemisphere. They bear beautiful white, pink, or rose-colored flowers, and many of the species are cultivated as ornamental plants. Among the best of these are Van Houtt's spiraea, a hardy shrub with

dense, deep-green foliage; Thunberg's spiraea, which has leaves of more delicate character; the hardhack, or steeplebush, adapted for mass planting, having flowers in narrow, crowded clusters; and the plum-leaved spiraea, described elsewhere in these volumes under the title



SPIRAEA

BRIDAL WREATH. Another well-known species, commonly called *meadowsweet*, is regarded as a troublesome weed in New England. B.M.D.

Scientific Names. The genus belongs to the family Rosaceae. Van Houtt's spiraea is Spiraea vanhouttei; Thunberg's, S. thunbergii; the hardhack, S. tomentosa; the bridal wreath, S. prunifolia; and the meadow-sweet, S. latifolia.

SPIRAL NEBULAE. See NEBULA.

SPIRE, in architecture, that part of a tower or steeple which rises from the top in the form of a pyramid. (For examples, see illustrations under CATHEDRAL.) In the earliest form, the spire was little more than a slightly raised, four-sided roof, but gradually these structures became taller, more slender, and usually octagonal in shape. The cathedral at Cologne, Ger-

many, has spires over 500 feet high, while the finest spire in England, that on Salisbury Cathedral, is 406 feet in height. The spire of the First Methodist Church in the Loop district of Chicago reaches 556 feet. The general effect of a building surmounted by spires is very striking. In Milton's Paradise Lost, these lines occur:

> The glorious temple rear'd Her pile, far off appearing like a mount Of alabaster, topt with golden spires.

SPIRES, DIET OF. See PROTESTANT. SPIRILLUM, spi ril' um. See BACTERIA AND BACTERIOLOGY (Kinds)

SPIRIT LAKE. See IOWA (Rivers and Lakes).

SPIRIT LEVEL. See LEVEL.

SPIRITS OF CAMPHOR. See CAMPHOR. SPIRITS OF HARTSHORN. See Am-

SPIRITUALISM. The term usually refers to the modern form of the belief in the survival and communication of the spirits of the departed. This grew out of certain disturbances in a house at Hydeville, N. Y., in 1848; the disturbances appeared in the presence of the two Fox sisters, and consisted of raps and mysterious moving of objects. By agreement that one rap should mean "No," and three "Yes," the knocker revealed himself, in answer to questions, as the spirit of a murdered peddler. The movement found favorable soil and grew rapidly to enormous proportions. Mediums appeared everywhere, and spiritualists were numbered by the hundreds of thousands; "seances" were widely held and spread to England and the Continent, at which eager sitters sought communication with deceased relatives, and in that intercourse found a religious consolation.

The seances took the form of movements, apparently without physical contact, of tabletipping and floating of objects; of communications through the medium, who was sometimes in a trance state; of spirit materializations; of writing on sealed slates; and of a variety of startling performances which one and another medium devised. Prominent in the group were the performances in a "cabinet," which the medium entered securely bound, while bells were rung, tambourines played, chairs overturned, and faces appeared almost as soon as the "cabinet" doors were shut; when opened, the medium seemed as securely bound as ever. Trance mediums contributed elaborate messages describing the spirit world, and sought to prove the identity of their source by references to the great personages of past ages.

This bare account of the movement gives no suggestion of the intensity of the interest and the absorption in mediums and their doings, which was widespread for two or three decades. Mediums were frequently detected in frauds of the most flagrant character, and the many failures were referred to unfavorable skeptical conditions. Investigations of a more or less critical character were made from time to time; but it was not until those made under the auspices of the Seybert Commission (1888). by the committees of the Society for Psychical Research, and by investigation with a knowledge of conjuring, that the fraudulent character of most of the manifestations was minutely analyzed. See Psychical Research; Contur-

On the other hand, these newer investigations, together with the proposal of telepathy as a possible explanation, the trance revelations (of Mrs. Piper and others), and the automatic writings of unprofessional mediums, brought the spiritualistic hypothesis again to the front. Some investigators concluded that the revelations thus emerging, so far beyond the knowledge of the mediums, and the frequency of premonitions and apparitions corresponding with the moment of death of the person communicating, all pointed to the spiritualistic as the only adequate explanation of the source of the messages.

SEET HE SOME HER SOME SEED OF S

Historically, modern spiritualism is connected with the unbroken series of "occult" interests and manifestations that stand as the heritage of magical belief and gave rise to the pseudo-sciences [see Science and the Sci-ENCES (Pseudo-Sciences)]. More particularly, the performances of somnambules (see Hypnotism) in a "mesmeric" state set the pattern for the reading of sealed messages, seeing without eyes, and similar performances which formed the stock in trade of the spiritualistic mediums. Again, the table-tipping and -rapping were already current (particularly in France), and were readily used for spiritualistic communication; they are examples of unconscious movements (see Subconscious). Finally, the apparitions, haunted houses, and noisy spirits have always been reported as part of popular belief and referred to a spirit origin. Thus modern spiritualism is essentially a revival of a general belief adopting newer modes of expression (and in its most recent phases raising issues more scientifically stated), which has a long history and has served to satisfy a certain type of interest and inquiry; such interest is closely related to the "occult." The loose character of the evidence, the invitation to fraud and self-delusion, the emotional interest in the issue, the contagious spread, the attraction of such beliefs to those of unstable mental disposition—all contribute to the readiness with which the spiritualistic performances were made to support unscientific belief and to conceal true motives for the popularity of the idea.

A critical investigation of spiritualism distinguishes the physical phenomena and the spiritual or revelational. The former consist of appearances seemingly defying the laws of physics; typically, they involve the assumption that the effect could not be ascribed to the ordinary agency of the medium. There is absolutely no connection between the failure to detect the manner in which the performance (or trick) is done and the conclusion that it is to be referred to a spirit. Nothing is more constant in the annals of spiritualism than the emphatic statement of investigators that fraud was eliminated, and yet the result was shown to be nothing more than a bare-faced or shrewd trick. Mediums have made international reputations, and there have been performances heralded as marvelous and endorsed by men of great reputation and scientific distinction; yet a proper investigation readily disclosed the method.

The best-known of such instances is the case of Eusapia Palladino, whose performances involved nothing more than the movement of a light table or the disturbance of objects in a draped corner, while apparently her hands and feet were controlled. As a fact, she is remarkably skilful in concealing the action by which she moves table and objects, and in escaping from the control of the sitters. Substantially, all the authentic performances of mediums have been repeated by conjurers; while in such tricks as slate-writing, the whole effect depends upon the illusion of the sitter that he has had constant sight of the slates, or upon the failure to detect the substitution of a prepared slate, or upon the action of the table to serve as a screen while the message is written under the table. A piece of gauze, a low light, an expectant atmosphere, and a convinced sitter will create a recognized spirit; while releases from ties and knots prove nothing but the adroitness of the medium. The vulgar atmosphere of fraud surrounding the physical performances is established. Yet they have served an educational purpose in proving how treacherous is unimpeachable evidence, how elusive fraud may become, how technical is the skill needed to discover it, how readily bias makes marvels out of plain tricks.

The revelational evidence (apart from the crude answers to questions in an ordinary seance) is of a different nature. It depends for its value upon its intrinsic character; upon the probability that the medium could not have attained it by ordinary means; upon the corroboration of the revelations. This type of evidence is difficult to estimate; the opportunities for exaggeration and delusion are subtle; more than all else, the coöperation of the medium (who may be in a trance state) is indispensable, and is not readily secured. It is the impressiveness of cumulative revelation that makes converts to the spiritualistic hypothesis of survival and communication of the departed. While

keeping as open-minded a reserve as is compatible with a scientific attitude, one may yet maintain that recent studies in psychology, which prove the extreme subtlety of the mind's operations and the large part played by subconscious tendencies, will eventually account for the revelational aspect of evidence.

J.J.

Relating to Various Beliefs. The articles in these volumes on the following topics are of interest in this connection:

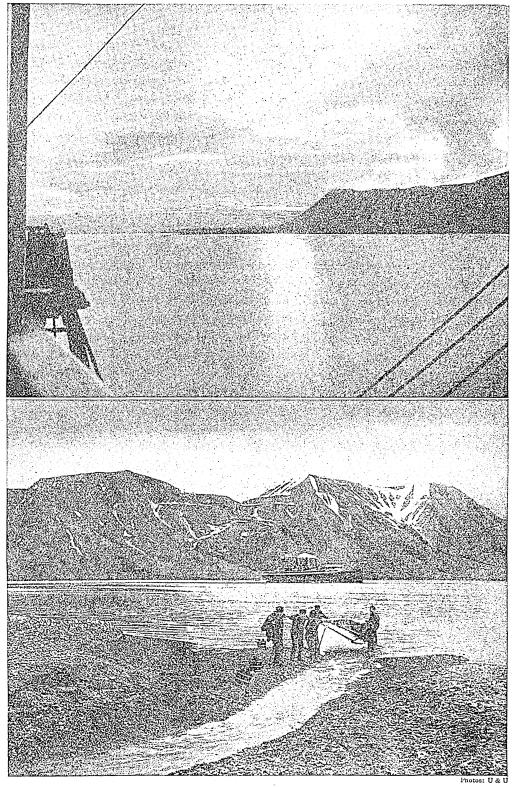
Alchemy Necromancy Astrology Occult Clairvoyance Palmistry Conjuring Phrenology Demonology Physiognomy Divination Psychical Research Ectoplasm Faith Cure Psychoanalysis Suggestion Hypnotism Superstition Magic Telepathy Medium Trance Mesmerism Witchcraft Mind Reading

SPIRIT WRESTLERS. See DUKHOBORS. SPIROCHAETES, spi ro ke' tez. See MEDICINE AND DRUGS (Medicines Dug Out of the Earth).

SPIROMETER, spi rom' e tur, a device for measuring the capacity of the human lungs; that is, the amount of air which can be expelled after a deep breath is taken. A spirometer in common use consists of two cylinders, the upper one so made as to move freely up and down when placed inverted within the other. To the upper cylinder are fastened a tube and an air cock, and the lower is filled with water. When the person under examination breathes into the tube, the air is collected in the inverted cylinder and it rises in the water, the number of inches it moves being recorded on a graduated scale. From this record is computed the number of cubic inches of air expelled. The spirometer is used in testing the lung capacity of candidates for the army and navy, applicants for athletic membership, and so on.

SPITSBERGEN, spits' bur gen, is a part of the Norwegian archipelago, Svalbard, within the Arctic Circle. Its area of 24,294 square miles comprises many small islands and the five large ones of West Spitsbergen, North East Land, Edge Island, Barents Island, and Prince Charles Foreland. For political map and map data, see Arctic Lands and Seas (map).

Much of the country is covered by large ice fields, and numerous glaciers extend and drop sharply into the sea. There are other areas, however, where the valleys are free of ice and where the glaciers are few and comparatively small. All of the islands are notched with many large fiords, where there are good harbors, but outside these inlets few shelters for ships are to be found. Coast lines are generally bordered by strips of narrow lowland that have been cut down from the solid



Bleak and Lonely Spitsbergen. Above, a spot 800 miles from the North Pole, where, during May, June, July, and August, the sun does not disappear below the horizon; there are four months of continuous daylight. Below, Advent Bay, an infrequent port of call.

rock by centuries of wind and frost action. Precipitous mountains tower above these flat edges and are essentially plateau-like in form.

Spitsbergen was in all probability discovered by Norwegians in 1194, and rediscovered in 1596 by Barents and Heemskerk, Dutch

navigators.

In 1607 Henry Hudson visited the islands. In the seventeenth century, a profitable whaling industry was established, and this resulted in dispute between England, Norway, and the Dutch nation over sovereignty. Within a hundred years, whaling declined, and the question of ownership again was of no importance until after 1900, when rich coal fields were By 1938 the coal exported discovered. amounted to more than 600,000 tons, most of which is used by Norway. In addition to the rich coal fields, gypsum has become of economic importance. There are also deposits of iron ore, which, however, is not of the high-grade type. The nationality of the islands was settled definitely by a treaty signed in 1920 at Paris, in which Norway's sovereignty was recognized by all the powers, although ratifications were delayed by Soviet Russia, and the treaty was not effective until August, 1925. However, hunting and fishing privileges in the territory were granted the nations participating in the negotiations.

Spitsbergen is a part of the most northerly land in the world on which people can live. The six mining camps, of which Longyearbyen (population, about 550) is the largest, are inhabited the year around. One of the mines at Longyearbyen was closed because of an explosion in 1920 and fifteen years later was still burning. An Allied raid under Canadian command wrecked the mines, fired huge coal piles, and evacuated the Norwegians in September, 1941. The move precluded any probable use-

fulness of the coal to Germany.

The islands have a slightly higher winter temperature than that at Leningrad, the lowest temperatures rarely reaching -30° . Winter sets in early in September, and for four months the sun is continuously below the horizon, although for three or four hours of each twentyfour, the darkness is slightly relieved by faint twilight.

There are no trees on the islands, but botanists report that 130 varieties of flowers and plants grow during the short Arctic summer. Many birds, mostly swimmers, inhabit

the region.

SPITZ DOG, a white or biscuit-colored dog resembling a large pomeranian. The weight varies from twenty to thirty pounds. The coat is long and profuse. While this dog is somewhat popular, it is not recognized officially. It belongs to the northern general group of dogs, also known as the spitz (lupine) group.

W.J.

SPLEEN, the largest gland of the body not having a discharging tube. It lies below the diaphragm, to the left and a little back from the stomach (see GLANDS). In adults the spleen is about five inches long and three or four inches wide, and it weighs about seven ounces; it is soft and spongy, crumbles easily, and is a deep violet-red in color. The organ is a mass of cellular tissue covered by a fold of serous membrane from the peritoneum, or membrane that lines the abdominal cavity, which passes over it from the diaphragm, holding it in place.

The function of the spleen is not definitely known. It may be completely removed from the body without any demonstrable ill effects. This procedure is, in fact, often very important in relieving discomfort from diseases which center in the spleen. The fact that one may survive its removal would seem to indicate that the function of the spleen must be purely accessory. Before birth there is evidence that some of the red blood cells are formed by the spleen. This function seems to cease after birth, and the organ seems to be concerned in some way with the destruction, rather than the formation, of red cells.

The spleen belongs to the lymphoid system of the body.

K.A.E.

SPLENÍC, *splen' ik*, FEVER. Another name for Anthrax (which see).

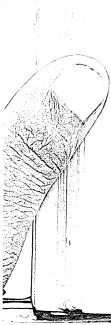
SPLICING, the process of joining two rope ends without tying, by interweaving the loosened strands, which, in turn, are composed of

yarns or fibers twisted together.

The three kinds of splices in general use are known as the *short*, *long*, and *eye* splices. The short splice (Fig. 2) is made by placing the rope ends together in such a manner that each strand lies between corresponding strands in the second piece. The weaving of the first two is easy, but the placing of the third is more difficult; the rule is to "go over one and then under one." A long splice is not a long-woven short splice, but is made by raveling the strands back two or more feet, and then, after placing the ends together as in the short splice, continuing to displace one strand by laying the other in its place. Near the end of the strand, the two are tapered, tied, and the loose ends are carefully interwoven in the body of the rope.

If the rope is bent back and the end spliced into its own body, there is formed an eye or ring (Fig. 3). The method of lacing is the same as that used in making the short splice. To avoid friction that would soon wear out a rope that must bear a heavy weight, an iron thimble is often inserted in the eye splice.

The three loose strands may themselves be intertwined in such a manner that a symmetrical knot is made at the end of the rope; this is called a *single wall knot*. There are few



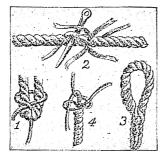
other methods of stopping a rope that are as practical (see Fig. 4 in the illustration).

A rope end may be bent back to form a ring

or hook called a bight, and a second rope tied or laced in, as in Fig. 1. This is called a becket hitch. See Knots.

SPLIT IN-FINITIVE. See INFINITIVE.

SPOILS SYS-TEM, in politics, a system by which officeholders of all degrees of importance are dismissed after their party



SPLICING

(1) A rope end bent to form a ring, and a second rope tied or laced in; (2) short splice; (3) eye splice; (4) wall knot.

has been defeated in an election, to make places for new appointees of the successful party. Great party leaders, with endless patronage at their command, have since ancient times rewarded their followers by giving them offices. The only way to find enough places to supply the office-hungry partisans of a new administration is to turn out the holders, even though

they are experienced and efficient.

In the United States, the system found its greatest exponent in Andrew Jackson, whose friend, William L. Marcy, gave the system its name when he declared that "to the victor belong the spoils of the enemy," in politics as in war. Since the days of Jackson and Marcy, however, a feeling has arisen, not only in the United States, but in Canada, England, and other countries, that governments are operated not for the financial profit of a few political leaders and their officeholding friends, but for the benefit of the people. This spirit has slowly developed a new method of appointment to many of the offices in the governments of to-day; this is described in the article CIVIL SERVICE (Civil Service Reform). See. also Jackson, Andrew (His Administration).

Jackson, Andrew (His Administration). SPOKANE, spo kan', Wash., the county seat of Spokane County and the second largest city of the state, ranking next to Seattle. It is situated in the eastern part of the state, sixteen miles west of the Idaho state line, 288 miles east of Seattle, and 376 miles northeast of Portland. The Spokane River flows through the city from east to west, in a series of cascades, not only adding to the scenic beauty, but providing immense power for manufacturing purposes. Population, 122,001 (Federal cen-

sus of 1940).

General Description. Spokane is situated 1,891 feet above the sea, and within a short motoring distance of the city are seventy-six lakes, including Pend Oreille, Coeur d'Alene, and

Spirit, all renowned for their beauty. Spokane is a well-built modern city, with beautiful homes in its residential districts, and a business section of high architectural type. A key point in the country's air defense, Spokane is the headquarters for the United States Army Air Corps operation in eleven states.

The largest of the city's fifty-three parks, which have a total area of 2,720 acres, include Manito, with its beautiful sunken gardens, Natatorium, Cliff, Minnehaha, Hays, Mission, Audubon, and Corbin. The High Drive Parkway, on the east bank of Latah Creek, overlooks the city and the Spokane Valley. The Appleway, to the east of the city, is a remarkable area of intensively cultivated orchards and gardens. There are also 2,200 acres in adjoining state parks.

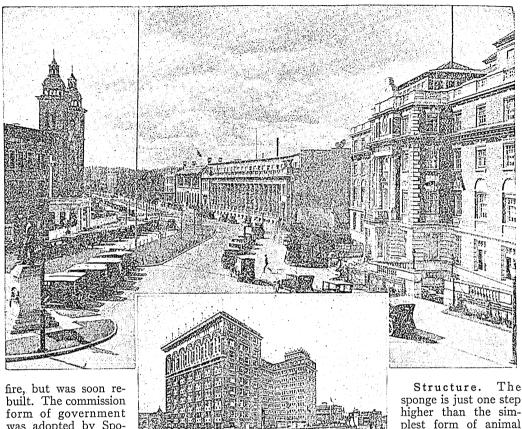
Transportation. Spokane is the most important railway center of the Pacific Northwest, having the service of six trunk-line railroads—the Northern Pacific, the Chicago, Milwaukee, Saint Paul & Pacific, the Great Northern, the Union Pacific, the Spokane International, and the Spokane, Portland & Seattle. Many branch lines and interurban and motorbus lines also center here. The city has a municipal airport.

Industry and Commerce. Spokane and the territory it serves have become known as "the Hub of the Inland Empire"—that great stretch of country which embraces 150,000 square miles in Eastern Washington, Northern Idaho, Northeastern Oregon, and Western Montana. Agriculture, mining, and lumbering are the chief basic industries. The famous ing are the chief basic industries. Northwest apples are sold in all the markets of the Large yields of small fruits are also produced. The city is an important livestock center, and the great area of pine forest supplies material for sawmill products, paper, and furniture. One of the leading factors in the city's prosperity is the vast water power afforded by the Spokane River. The famous Coeur d'Alene silver mines and the Chewelah magnesite quarries and reduction plant are also operated by Spokane power. As the city is situated advantageously to the various Pacific ports, it is the point from which large amounts of lumber, wheat, fruit, silver, lead, and other raw products of the Pacific Northwest are shipped. It is a port of entry.

Institutions. Educational institutions include Gonzaga University, Spokane Junior College, Academy of the Holy Names, Saint Joseph's School for boys, Saint Augustine's School, and Whitworth College. Other institutions include the Grace Campbell Memorial Museum, orphanages, hospitals, and homes for the

dependent.

History. The first settlement was made in 1874 by James N. Glover, and was originally called Spokane Falls; the name is of Indian origin, meaning children of the sun; hence the city is locally referred to as "Sunny Old Spokane." It became the county seat in 1882, and the present name was adopted in 1890. The Northern Pacific Railroad constructed its line to this point in 1883, thus greatly aiding in the development of the great natural resources of the region. In August, 1889, the business section of the city was destroyed by



HORITH HEALTH BEREIN

IN THE CITY OF SPOKANE

the city.

was adopted by Spokane in 1910. W.G.O. SPOLIATION. See

CONTRACT.

SPOLETO. See ITALY (back of map). SPONGE, spunj,

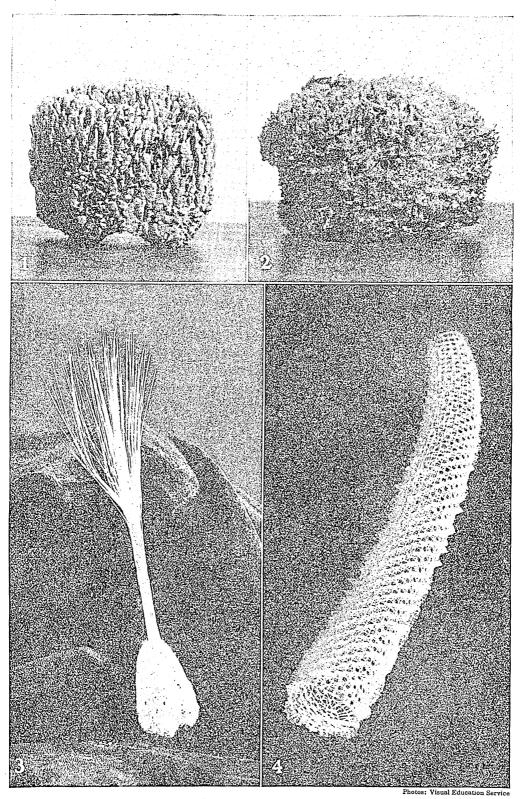
the common name of a group of sea animals forming the lowest branch of living things composed of many

Their scientific name is Porifera (which cells. see). The skeleton of one species gives the world its commercial sponges. People used to consider it a plant, perhaps because it cannot swim, but grows attached to shells, rocks, wharves, or the sea bottom. It is curious to note that, when it roots in mud, it develops a stem in order to keep from being smothered. Living sponges are brilliantly colored, different varieties showing various shades of red, yellow, purple, blue, and green, as well as brown and gray. While they are found in practically every zone, they develop best in tropical or the warmer temperate regions. They make their homes at all depths—close to shore and as many fathoms deep as the ocean has been explored by man—and have existed for many ages; their fossils occur in very old rock.

life, the single cell. Beginning with a tiny egg, it develops into a soft mass of slimy flesh made up of many individual cells, all formed through the continued division of the original The upper illustration is that of the civic center. cell. Certain of the Below is a modern hotel in the business section of cells give rise to skeletal rods of many differ-

ent shapes, composed of different material in different kinds of sponges. On the outer surface of the sponge body are countless pores. From this fact the subkingdom derives its special name of Porifera-meaning, literally, bearing pores. Through these countless minute openings, the sea water streams in at all points, and is carried into every part of the sponge's body by a network of canals, or tubes. If we cut through an ordinary bath sponge, these branching canals can be seen in the skele-

In the inner membrane, along the canals, are groups of cells provided with little lashes called flagella, which, by their constant waving to and fro, keep the water circulating. Thus the sponge is equipped with a perfect "irrigation system," by means of which the animal gets



Four of the Sponges. (1) Velvet, from Florida. (2) Sheepswool, also a Florida product. (3) Glass rope, from the Indian Ocean. (4) Venus's flower basket, from the Indian Ocean. 6773

the food and air necessary for life; for the water brings oxygen, together with bits of plants and tiny living organisms. The sponge has no general stomach to digest this food; instead, each cell selects from the current whatever it needs. As the water flows out through

the large outer openings, it carries away all waste matter and surplus food.

Sponges take many different shapes. The form depends to a large degree upon the neighborhood in which they grow, for their soft tissue is, of course, very yielding. In shallow water, where there is more or less disturbance, they are usually irregular; those which grow in deep, quiet water are, as a rule, beautifully symmetrical and often very wonderful. Some sponges are thin and flat; some grow like low bushes with widespreading branches; some look like fans; others resemble cups, vases, or slender cylinders. In height they range from the merest fraction of an inch to over three feet.

The Skeleton. On account of the jellylike substance of which the cells are composed, a skeleton is very

necessary to support and protect the animal. In some species the skeleton looks like lime or white marble; in others it is flinty or glassy in appearance. The exquisite, lacy Venus's flower basket, which used to be credited to skilled Chinese or Japanese craftsmen, is nothing but the framework of a dead glass sponge. These lime and flint skeletons are composed of myriads of tiny bodies called spicules, made of a substance secreted by some of the cells. In

the form of delicate threads, slender needles, or oddly shaped crystals resembling snow crystals, these spicules intertwine to make the solid mesh of the skeleton. Sometimes they push through the tissue and cluster around the mouths of the canals, thus barring out dangerous intruders.

Another protective feature of the sponge is its very disagreeable odor, suggesting garlic—a highly effective weapon for keeping at a distance fish and other creatures that might feed on it.

Besides the limy and glassy skeletons, there is a third class, characterized by elastic, horny fibers resembling silk; and it is this variety that provides the absorbent bath sponge.

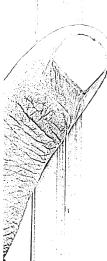
The Sponge of Commerce. Sponges are gathered for trade purposes in various ways. In some localities, especially the Mediterranean Sea, where they grow in very deep water, they are collected by divers. In other places, dredging is resorted to. The fisheries off the reefs of Florida use harpoons and divers. Spongefishing crews go out in large vessels for many weeks at a time. The men are sent out from

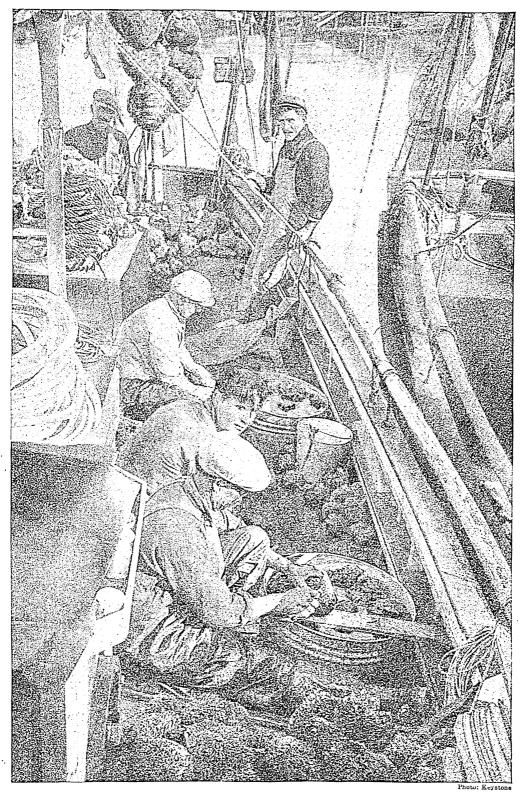


NOT A GOOD HEADPIECE FOR A RAINY DAY

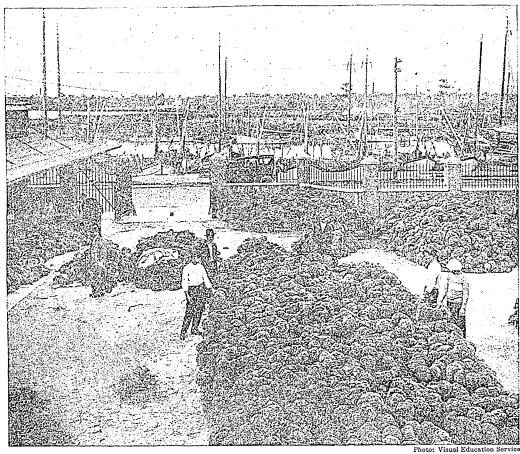
The sponge on the boy's head is the largest ever taken from the fishing grounds at Key West, Fla. Surrounding him and at his feet are several Florida varieties.

the ships in pairs, one to manage their rowboat and the other to do the actual fishing. By means of a glass-bottomed bucket, the latter can see to a depth of sixty or more feet; and when he discovers a sponge of fair size, he lets down his long forked pole and dextrously spears it. The sponges are spread about the deck or buried in sand until the flesh decomposes, and are then thrown into small pens filled with water, called *kraals*. From time to





A Floating Sponge Market. A vessel in Key West harbor, just returned from a successful trip, laden with sponges. The owners are waiting for purchasers.



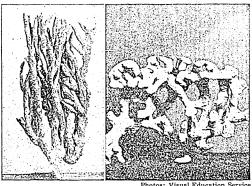
SPONGE FLEET WITH SPONGE EXCHANGE IN THE FOREGROUND, TARPON SPRINGS, FLORIDA

time, they are beaten to dislodge the decayed substance, and when thoroughly clean are strung and hung up to dry, after which they are ready for the market. Sometimes they are bleached, but this makes them less durable.

The finest, softest sponges come from the Mediterranean, particularly from the neighborhood of Turkey; the next best grade is the Red Sea product. These foreign sponges are now scarce and command high prices. Nearly all the sponges used in the United States come from the fisheries of Florida and the Bahama Islands. The best grades of Florida sponges are called sheep's wool. Cheaper grades are the ordinary yellow sponge and the very coarse grass sponge. Although the Mediterranean fisheries produce a far smaller quantity, the value of their output is considerably greater, on account of its superior quality. The weather has much to do with the size of the yield.

In recent years, scientists have been experimenting with artificial production, since many of the richest sponge beds are now all but exhausted. The most promising method appears to be that of cutting up those sponges which

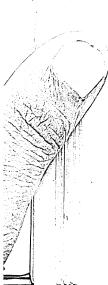
are too small or irregular to be salable, and stimulating growth from these pieces, which are called plants. The United States government



GROWING SPONGES

has passed legislation to protect the Florida sponge fisheries from improper fishing methods. Fresh-Water Sponge. Although the sponge is properly a marine animal, a certain branch of

the family has adapted itself to fresh water.



It is to be found in ponds, rivers, and lakes in nearly all parts of the world, particularly where the water is quiet. One must look very closely to find these sponges, for they are only from half an inch to an inch long. They have the same porous, cellular bodies and supporting skeletons as their sea-born relatives, and the same habit of clinging to stones, leaves, and other objects. However, they cannot boast the same vivid coloring or curious forms; they are green or grayish, and grow either in flat masses or—in spots where the water is very still—as miniature bushes.

The principal difference between the marine and the fresh-water sponge is that in the latter there is provision for carrying the eggs over through the cold weather. Toward the end of the year, there form within the grown sponge what are called winter buds—minute cells or eggs encased in a thick membrane, which fall to the bottom. They remain dormant until spring, and then multiply by cell division.

These fresh-water sponges are within every one's reach, and it is interesting to collect specimens in late summer, when they are fully developed, and preserve them in diluted alcohol. By studying them through even an ordinary microscope, one can learn a great deal about this group of sponges.

S.H.S.

Scientific Names. The scientific name of Venus's flower basket is *Euplectella aspergillum*; that of a very common bath sponge is *Euspongia officinalis*. Fresh-water sponges belong to the genus *Spongilla*.

SPONTANEOUS COMBUSTION. See Combustion, subhead.

SPONTANEOUS GENERATION, OR AB-IOGENESIS, ab ih o jen' e sis, the theory that certain lower forms of life have come into existence out of non-living matter. In the seventeenth century, many people believed that worms were generated spontaneously in cheese and timber, mice in mud, and maggots in the juices of decaying meat. In 1668 an Italian biologist named Redi showed that no maggots were bred in meat when flies, kept away by wire netting, were prevented from laying eggs in it. This experiment discredited the whole theory, but, in the eighteenth century, spontaneous generation was revived to account for the origin of the countless bacteria and protozoans made known to science through the improvement of the microscope. Not until the middle of the nineteenth century, after a series of investigations culminating in the experiments of Pasteur, was the theory of spontaneous generation of microörganisms wholly abandoned.

Since then, scientists have held to the doctrine of "all life from preceding life," though they limit this concept to the field of actual observation and experiment. Biologists think it probable that the first forms of life developed

by chemical processes out of non-living matter under special conditions prevailing in early geologic time. Some authorities believe that "starts of life" may be taking place to-day, but such developments, if actually occurring, have never been observed in nature, and possibly cannot be.

Related Subjects. The reader is referred in these volumes to the following articles:

Bacteria and Bacteriology Biology Evolution

Fermentation Geology Pasteur, Louis Protoplasm SPOONBILL, a wading bird, similar to the ibis, distinguished by its odd, spoon-shaped bill, which it swings from side to side in the water in search of shellfish, marine insects, and small crabs. The most beautiful species is the roseate spoonbill, native to the warmer regions of the Americas, though in Florida, where it was formerly abundant, it has been exterminated by plume-hunters. The neck and the upper back of this bird are white, and the rest of the plumage is a rosy pink, becoming carmine on the wing coverts. It nests in colonies, returning year after year to the same locality. The nest is a platform of sticks, placed in low trees or shrubs. The eggs are five to seven in number, spotted and blotched with olivebrown.

Scientific Name. The spoonbills belong to the family *Plataleidae*. The roseate spoonbill is *Ajaja ajaja*.

SPOONBILL CAT. See PADDLEFISH. SPOON RIVER. See Illinois (Physical Features).

SPORE, a minute body borne by lower plants, such as algae, ferns, mosses, and lichens, which has the same function as a seed in higher plants—that of reproduction. Spore-producing plants, which are known as cryptogams, are of two kinds, those containing green coloring matter used in the manufacture of plant food (see Chlorophyll), and those which must draw nourishment from other plants, or have other sources of organic matter. It is the latter—the organisms causing smut on corn, cotton wilt, wheat rust, apple blight, and the like—that are of special concern to the agriculturist, though there are numerous plants of this class that are harmless. A typical spore is a single living cell; that is, a mass of protoplasm with differentiated nucleus and often with characteristic cell wall, and containing food materials. See CRYPTOGAMS.

SPORT, a play, game, or form of amusement. See Amusements; Athletics; Games and Play; and lists at the ends of these articles.

SPORT, in science. See Evolution (The Factors of Evolution).

SPOTTED ALDER. See WITCH-HAZEL. SPOTTED FEVER. See Typhus Fever.

SPOTTISWOOD, LADY JOHN SCOTT (1810-1900), the composer of the music to Annie Laurie

SPOTTSYLVANIA, spot sil va' nih ah, COURT HOUSE, BATTLE OF. See WAR OF SECESSION.

SPRAIN, a form of joint injury in which the tough, fibrous bands, or ligaments, which hold the joint in place, are torn in part or in whole. A minor sprain, involving stretching but not laceration, is sometimes called a strain, but these terms are commonly used interchangeably. Sprains may occur at any joint, but are most frequent at the ankle, owing to its bearing the weight of the body. Torn ligaments must be supported until they have healed. This was formerly accomplished by putting on a plaster cast, thus making it impossible to move the joint. When the elbow or shoulder joint is injured, an arm sling is used.

Quick Recoveries from Sprains. person who is interested in quick recovery after a bad sprain will do well to read an account of how the badly sprained joints of athletes are treated at the University of Pennsylvania. The men who play in major competition, for instance football, must not stay out of the game long. Therefore it was up to Dr. A. B. Light, who looks after their physical condition, to work out a method of quick, and at the same time effective, cure.

The sprained joint is very tightly wrapped in a very firm bandage. This bandage is wrapped almost tight enough to cause pain. It is put on at once. The next step is the application of cold wet cloths. It is better not to use ice; 65° to 68° is the temperature at which the capillaries are most constricted, and that is the objective. Chilling below that degree of cold causes the capillaries to dilate. To put the sprained joint in hot water does cause temporary ease, but it also causes the capillaries to dilate, and that is harmful.

The joint is kept elevated for two hours while this tight bandage is on and cold cloths are being applied. At the end of two hours, very tight bandages are applied, but not so tightly as before; they are snug and firm, but not painful. The joint is kept elevated for twenty-four hours. At the end of this twentyfour hours, the bandages are removed, a gentle massage is given, and X-ray pictures are taken to discover whether there are any fractures. If there are none, the snug bandages are reapplied and the man uses the joint a little. At the end of this short period of use, the joint is again elevated and left quiet for another day. This treatment is continued until the third day.

On the third day, the bandages are removed and heat is applied to the joint while it is elevated. This is continued for one-half hour. A more vigorous massage is given. The joint

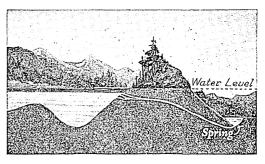
is used for a short time. The bandage is reapplied. On the fourth day, this treatment is repeated. On the fifth day, the subject is made to exercise the joint much more. If it is the ankle joint, he is asked to run a short distance. Then a Bibboney supporting boot is put on that foot, and the man is told to use the joint rather freely. At the end of one week, all strappings are removed. For some time the athlete should strap this joint just before entering a contest.

The principle of this Light method of treating sprained joints is that most of the pain and swelling comes from hemorrhage into the tissues around the joint. This treatment aims to prevent hemorrhage and oozing. See First AID TO THE INJURED.

SPRAT, a sea fish, one of the smallest species of the herring family, growing only about six inches long. It is often taken for young herring, but can be distinguished from the latter by the sharply notched edge on the abdomen. Sprats live in shoals along the European Atlantic and Mediterranean coasts. They are caught in immense numbers with bag nets or seines, and make a cheap, wholesome food, being eaten fresh, smoked, or pickled in brine. The European sprat is Harengula sprattus. L.H.

SPREAD-EAGLEISM, spred e' g'l iz'm. See JINGO.

SPRING. During a rainstorm, a part of the water soaks into the ground and filters downward until it reaches a layer of rock or clay, through which it cannot pass. This layer may come to the surface farther down the slope,



THE ORIGIN OF A SPRING

and if the water finds a channel along which it can flow, it comes to the surface as a spring. Springs are most numerous in mountainous and hilly regions. Sometimes they flow from crevices in the rock high up on the side of a cliff, but they are more frequently found at or near the foot of a cliff or some other slope.

Notable Springs. From the walls of the Snake River Canyon in Idaho, leap a thousand springs forming veils of silver lace upon the grim walls of black lava. These springs, which enhance forty miles of the canyon, could furnish 120 gallons of water a day for every person in



all the cities of the United States of over 100,000 inhabitants. While not available for that purpose, some, at least, of the "white horses" have been harnessed for power.

The largest limestone spring in America is Silver Spring, Fla., which has a maximum flow of 822 cubic feet a second. Blue Spring, in the

same county, is the second largest.

According to the United States Geological Survey, there are nine states having springs of the first magnitude; that is, having an average discharge of 65,000,000 gallons of water a day, or enough to supply a city of

500,000 inhabitants.

Hot and Cold Springs. The temperature of springs is nearly the same as that of the underground rock over which the water flows. Cool springs have deep sources, whose temperature is not affected by climatic changes, and which varies but little throughout the year. On the other hand, a spring whose source is near the surface will be much warmer in summer than in winter. In volcanic regions, the water may come in contact with hot layers of rock, and when this occurs, a hot, or thermal, spring is found.

Mineral Springs. Water, in filtering through the ground, dissolves carbonate of lime and various other minerals. Springs whose waters contain these substances in solution are known as mineral springs. Various gases, such as carbon dioxide, sulphureted hydrogen, and nitrogen, are also found in the water of these springs. Some mineral springs have become noted health resorts because of the curative properties of their waters. Saratoga Springs and Sharon Springs, N. Y.; Mount Clemens, Mich.; the springs at Karlsbad, Sudetenland, and the hot springs at Hot Springs National Park, Ark., and at Thermopolis, Wyo., are good examples of such springs. R.H.W.

SPRING, the quality of a material by virtue of which it can "spring back," or resume a position from which it has been forced; or that quality of a material which causes it to rebound to its original position, after some force which has disturbed it is released. It is a characteristic of such materials as steel wire or rods, rubber, whalebone, and wood. The term spring is also applied to various devices and

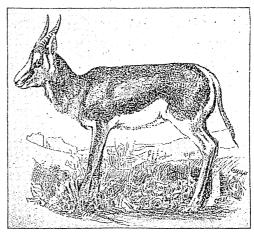
mechanisms.

In carriages, automobiles, and other vehicles, springs are used between the axles and the body of the vehicle to decrease concussion. In watches and clocks, they are used to produce motion, being wound rather tightly around a central post, then gradually unwinding and imparting motion to the mechanism. Springs may return to their natural position slowly, as in the case of the mainspring of a watch, or quickly, as in a gun or rifle, in which the spring is suddenly released from high tension, setting in motion the hammer, or pin, which explodes

the charge. The quick action of a spring also occurs when a bow is bent and the cord is released. In the familiar spring-balance scales used in stores, the spring causes an indicator to move according to the tension. The weight of the article on the scale is ascertained, and when this is removed, the spring resumes its normal position. See Elasticity. SPRING. See Seasons.

SPRING BALANCE. See BALANCE.

SPRINGBOK, OR SPRINGBUCK, a species of South African antelope, the nearest ally of the true gazelles, so named from its habit of springing upward, sometimes as high as twelve



THE SPRINGBOK

feet, when alarmed or at play. Among the Dutch settlers, it is known as trekbok, or traveling buck. Large herds, because of drought and loss of more secluded pasture, migrate into more fertile regions, clearing the plains of grass and annoying the herdsmen of those districts. The springbok is exceedingly graceful, and is the most slenderly built of all antelopes. Its coat is close and short, of a dull-brown color, with a white stripe extending from the middle of the back to the tail. The horns curve in the shape of a lyre, and in the female are not so deeply ringed as in the male. The skin is valuable. When in good condition, the flesh is excellent for food. See ANTELOPE.

Scientific Name. The springbok belongs to the family Bovidae. Its scientific name is Antidorcas

SPRINGER. See Arch.

SPRINGFIELD, the name of a rifle (which see).

SPRINGFIELD, ILL., the capital of the state and the county seat of Sangamon County, is located in the central part of the state, on the Sangamon River, 185 miles southwest of Chicago and ninety-nine miles northeast of Saint Louis. The city is the center of a productive agricultural region, and lies in one of the important bituminous coal fields of the state. Its chief historic fame rests upon the fact that for many years it was the home of Abraham Lincoln; and here is his tomb, as well as his former home, now owned and maintained by the state. Population, 75,503 (1940).

Springfield covers an area of over nine square miles. It has an excellent park and boulevard system. The principal parks, which cover 600 acres, include Lincoln, Washington, Dougsystem. las, Reservoir, Bunn, and Bergen. In Oak Ridge Cemetery, adjacent to the city, is the Lincoln National Monument. The lower part is a mausoleum containing the remains of Abraham Lincoln and members of his family. In the center rises a shaft 121 feet high. At its base, in front, is a statue of Lincoln, and at the four corners are groups of statuary symbolizing the cavalry, navy, artillery, and infantry of the United States. This monument, raised by contributions from all over the United States, was designed by Larkin G. Meade, and dedicated in 1874. In 1931 the reconstructed monument, with a greatly improved interior, was dedicated.

Transportation is furnished by the Baltimore and Ohio-Alton Railroad system, Chicago & Illinois Midland, Illinois Central, and Wabash railroad; an electric road (Illinois Terminal System), and a modern airport.

Industries. In addition to large flour and grain processing plants and coal mining operations, Spring-field manufactures electric meters, gasoline tractors, garage equipment, agricultural implements, brick and tile, radio parts. warm air furnaces, hydraulic presses, road building machinery, shoes, miners' lamps and supplies, mattresses, and heavy duty steam boiler installations. Electric power is available at low rates.

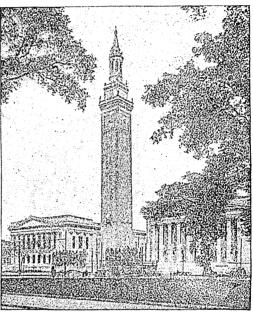
Institutions and Buildings. The Illinois State Capitol building, the cornerstone of which was laid in 1868, dominates the public buildings of the city. It is in form of a Greek cross with a dome 365 feet high. It was first occupied in 1876. Other state buildings include the Supreme Court Building, the reconstructed Armory, and the Illinois Centennial Memorial Building, erected to commemorate Illinois' admission to the Union in 1818, and the State Archives Building. Institutions include a college of music, a law school, Springfield Junior College, a Lutheran college, three sanitariums, and homes for the aged and for children.

Water Supply. The water supply comes from a modern water treatment plant, and a huge reservoir fifteen miles long, Lake Springfield, southeast of the city, developed for recreational and residential purposes.

History. Springfield was first settled in 1818, and made the county seat of Sangamon County. It was incorporated as a town in 1832, and in 1840 was chartered as a city. In 1837 Springfield was made the capital of the state, and the legislature first met here in December, 1839. The city has the commission form of government. It is the birthplace of the poet Vachel Lindsay (which see). See also illustrations, pages 3351, 3357, and 4012. R.B.I.

SPRINGFIELD, Mass., a port of entry and the county seat of Hampden County, is situated in the southwestern part of the state, in the beautiful valley of the Connecticut River, ninety-nine miles southwest of Boston, 105 miles southeast of Albany, and 137 miles northeast of New York City. Springfield is one of the most attractive cities of New England, and has varied and extensive industries. Population, 149,554 (1940).

General Description. Springfield occupies a site of great natural beauty on the east bank of the Connecticut River, about six miles from the Connecticut state line. Adjacent to the



CIVIC CENTER OF SPRINGFIELD, MASS.

city, and forming a part of its larger or metropolitan area, are the cities and towns of Chicopee, Ludlow, Longmeadow, Agawam, and West Springfield. The handsome concrete Memorial Bridge, dedicated in 1922, is one of the interesting features of the city. This bridge spans the Connecticut River, and was built to commemorate the patriotic service of the citizens of Hampden County.

The park system of Springfield constitutes a total of 1,944 acres. Forest Park, the largest, contains one of the finest collections of lotus plants and aquatic flora to be found anywhere in America. A monument to William McKinley, by Martiny, stands in the park at the rear of the Municipal Group. Merrick Park contains Saint Gaudens' Iamous statue The Puritan (see Puritans, for illustration), and in the northern part of the city stands a monument in honor of the soldiers of the Spanish-American War. The streets are wide and tree-lined, and there are many handsome residences.

Transportation. Springfield is the center of transportation lines, both rail and motor, for western New England. The city is served by the Boston & Albany, the Boston & Maine, and the New York, New Haven & Hartford railroads. Westover Field, an important air base, occupies 4,300 acres northeast of the city.

Industries. As a manufacturing and retailing center, Springfield occupies a prominent position. Among the principal manufactures are firearms, cutlery, bicycles and motorcycles, railroad cars and supplies, electrical machinery, foundry and machine-shop products, confectionery, cotton and knit goods, brass and bronze goods, and meat-packing products. The printing and publishing industry is likewise important; Webster's International Dictionary is published here. The city is also an insurance center.

Institutions and Buildings. The educational institutions include Springfield College, the training school of the International Young Men's Christian Association, the American International College, the High School of Commerce, and the MacDuffie and the Elms, both schools for girls. In the city are a government arsenal and an armory. The arsenal was established by the Continental Congress during the Revolutionary War, and the armory, established in 1794, makes a large part of the small arms used by the soldiers of the United States. Other noteworthy structures are the Museum of Fine Arts, the George Walter Vincent Smith Art Gallery, the Museum of Natural History, the William Pynchon Memorial Building, the Union Railroad Station, and an impressive group of municipal buildings.

History. Springfield was founded in 1636 by William Pynchon, who led a company of settlers there from Roxbury. The place was known as Agawam, after the Agawam Indians, until 1640, when the name was changed to Springfield, after the native place of Pynchon. During King Philip's War, the settlement was burned by Indians, and was the center of disturbance during Shays' Rebellion (which see). Springfield was chartered as a city in 1852. For many years the city was the home of J. G. Holland, who is buried here, his grave being marked by a medallion made by Saint Gaudens. There is a city-planning commission which supervises the development of the city. A.L.P.

SPRINGFIELD, Mo., an important manufacturing city and the county seat of Greene County, is attractively situated upon a plateau in the heart of the Ozark Mountains, in the southwestern part of the state, 200 miles southeast of Kansas City and 238 miles southwest of Saint Louis. Springfield is the gateway to the beautiful White River and the country made famous by Harold Bell Wright in his Shepherd of the Hills. Population, 61,238 (1940).

Springfield lies at an altitude of 1,345 feet, and is regularly laid out on an undulating site with handsome residential districts. The park system embraces 255 acres, Doling, Dickerson Zoo, and Fassnight being the largest among the ten municipally owned parks. The city is the commercial center for a large fruitgrowing, farming, and lumbering district, and

has important interests connected with the mining and sale of lead and zinc.

Transportation. Railroads serving the city are the Saint Louis & San Francisco and the Missouri Pacific. Numerous motorbus and truck lines also serve Springfield. The Saint Louis & San Francisco Railroad main shops and general offices are maintained here. The city has a municipal airport.

Industries. The leading industrial establishments include flour and lumber mills, machine shops and iron works, wagon and trailer factories, meat-packing plants, and garment factories. Lead and zinc mines are near by. The city is an important poultry market.

Institutions. The educational institutions include the Southwest Missouri State Teachers' College, Drury College (coeducational), the Central Bible Institute, and Elfindale Academy: Hospitals include the Federal Medical Center (only one of its kind in the world), the O'Reilly General (army) Hospital, and the United States Hospital for Criminal Insane. Here is also located the Missouri Pythian Home for orphans and aged widows.

History. Springfield was settled about 1830, incorporated as a town in 1838, and chartered as a city in 1847. It was one of the most important strategic points west of the Mississippi River at the beginning of the War of Secession, and was controlled in turn by Union and by Confederate forces. The commission form of government was adopted in 1916. w.c.s.

SPRINGFIELD, Ohio, the county seat of Clark County, is situated in the west-central part of the state, forty-three miles west of Columbus, the state capital. The city lies in the upper part of the Mad River Valley, at the junction of Lagonda Creek and the Mad River, and is on the National Old Trails Road, United States 40, which traverses the country from Washington, D. C., to Los Angeles. Springfield is in a productive farming region, and is one of the world's best-known cities for the production of rose plants. Population, 70,662 (1940).

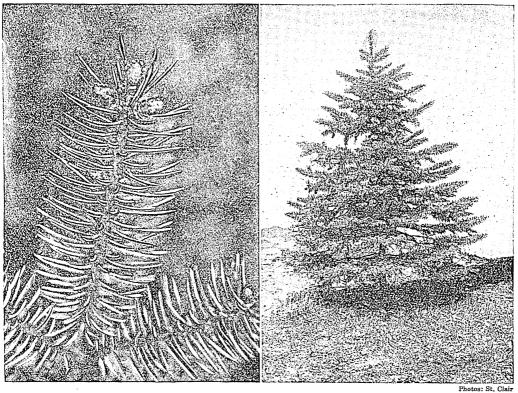
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The city occupies an area of over eleven square miles, the newer portion having spread over the higher and more undulating surface of the valley of Lagonda Creek. Numerous parks and playgrounds add to the attractiveness of the city.

Transportation. The Cleveland, Cincinnati, Chicago & Saint Louis, the Erie, the Detroit, Toledo & Ironton, and the Pennsylvania railroads serve the city, and there is also an extensive motorbus system which operates to neighboring points.

Industries. Springfield's industries depend upon the fine hydroelectric power provided by Lagonda Creek and Mad River. Products include motor trucks, road rollers, water turbines, electric fans and motors, boilers, burial supplies, incubators, gas engines, and fractional horse-power motors. The Crowell Publishing Company, one of the largest magazine-publishing plants in the United States, is located in Springfield.

Institutions. The leading educational institution is Wittenberg College (Lutheran), founded in 1845. On the hills near the city are the Ohio state homes



THE SPRUCE TREE

At left, detail of the twigs, showing how the buds emerge from their ends. At right, the general appearance of the tree.

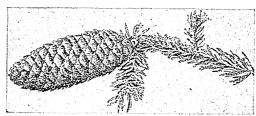
for the Masons, the Independent Order of Odd Fellows, and the Knights of Pythias. The city also has a home for orphan children, and the municipal and tuberculosis hospitals.

History. The first settlement was made in the vicinity in 1799, by Simon Kenton and a small party from Kentucky. This site, however, was later abandoned for the present one, on Lagonda Creek. When Clark County was organized in 1818, Springfield was made the county seat, and in 1850 it was chartered as a city. The commission form of government was adopted in 1914.

SPRING HILL COLLEGE, a Roman Catholic liberal arts college in Spring Hill, Ala.

SPRINGING BEETLE. See CLICK BEETLE. SPRUCE, the common name of a genus of evergreen trees belonging to the pine family. There are about thirty species, all native to the northern hemisphere. Their northern limit is beyond the Arctic Circle; their southern, the European Pyrenees, the Himalayas of Asia, and, in North America, North Carolina and Arizona. Of the cone-bearing trees, the firs are most closely related to the spruces, but the cones of firs stand erect, while those of spruces hang downward. Their needles, too, are dissimilar. Those of firs are arranged in flat

rows, while spruce needles grow thickly in spirals around the branches, pointing in all directions. The foliage of spruce is otherwise distinctive. The leaves are four-sided, or keeled, an inch or less in length, and they are joined to the twigs by woody projections that give the branch a rough, prickly feel when the needles have fallen. Spruce trees tend to grow



CONE OF WHITE SPRUCE

in pyramidal form, and in old trees the drooping lower branches brush the ground. Spruces are valuable lumber trees and yield various other products (see Uses, below).

Important Species. The white, black, and red spruces of the East and the Sitka spruce of the West are the most important commercial species of North America. The white and black spruces, named for the general tone of bark and foliage, are the most widely distributed of the species. In general, they grow between Bering Strait, on the north, and Maine, New York, and Michigan, on the south, with the black spruce following the higher altitudes to Virginia. British Columbia and Montana mark the western limits of their range. The white spruce may reach a height of 150 feet; the black is somewhat smaller. The ill-smelling foliage of the white spruce helps to distinguish this tree from the black. The red spruce is found from Nova Scotia to North Carolina and Tennessee. It varies from a small shrub, in the far north, to a tree 100 feet tall, in New Hampshire and Pennsylvania.

On the Pacific coast, between Northern California and Alaska, the Sitka spruce grows to huge size, especially in the swamps of tidewater regions. Giant specimens over 300 feet high are not uncommon. This is the species that was utilized in airplane construction during the World War. In Europe the principal spruce is the Norway, a handsome tree planted in Eastern North America as an ornamental. The so-called Douglas spruce, or Douglas fir, of Washington, Oregon, and British Columbia, belongs to a different genus, but is related botanically to the spruces. In yield of timber it rivals the redwood, which it nearly equals in size (see Sequoia).

Uses. Sprucewood is extensively used for wood pulp in the paper-making industry. The timber is strong, light, and elastic, and admirably suited for masts and spars of ships, boxes, and sounding boards of musical instruments, especially pianos, violins, and guitars. The tall, straight logs of Sitka spruce make the best airplane frames, because the wood fibers are long and close together and the timber is free from knots. Combining endurance and elasticity, the wood can be made into machines that withstand heavy blows without being shattered. Sprucewood is also used for interior finishing. Resin, tannin, and turpentine are products of spruce bark, and beer is made from young twigs. The gum (hardened resin) of black spruce is a commercial product. Dyes have been made from turpentine obtained as a by-product in the manufacture of paper. See Fir.

Scientific Names. The spruce genus is *Picea*, family *Pinaceae*. The white spruce is *P. canadensis*; the black, *P. mariana*; the red, *P. rubra*; the Sitka, *P. sitchensis*; the Norway, *P. excelsa*. The Douglas spruce, or fir, is *Pseudotsuga douglassi*.

SPRUCE KNOB, the highest point in West Virginia. See West Virginia (The Land).

SPRUCE PARTRIDGE. See GROUSE.
SPRUCE WOODS RESERVE. See MANI-

SPURGE FAMILY, or EUPHORBIACEAE, yu fawr be a' se e, a family of herbs, shrubs, and

trees, including about 4,000 species, many of which are the source of very useful products. Castor oil, croton oil, cassava, and rubber are among these products. The family includes also several ornamental plants, among them the poinsettia. Members of the spurge group bear small, inconspicuous flowers, but these sometimes have bracts (see Bract) of very brilliant hues. A biting, milky juice is a common characteristic of the plants. In Africa there are several species that can with difficulty be distinguished from cacti, when not in bloom. The plants of this family are especially abundant in the tropics.

Related Subjects. For other details, the reader is referred in these volumes to the following articles:

Cassava Castor Oil Poinsettia Rubber and Rubber Manufacture Tapioca

SPURGEON, CHARLES HADDON (1834-1892), one of the best-known English preachers of his day, was born at Kelvedon, in Essex, studied at Colchester and at Maidstone, and, by the time he was fifteen years old, had become usher in a school at Newmarket. Meanwhile, he had joined the Baptist Church, and was

preaching in and near Cambridge; his youthfulness attracted large audiences and his vigorous independence of thought held them. In 1854 he became pastor of the Baptist Chapel in New Park Street, London, and in 1861 the great Metropolitan Tabernacle, seating 6,000 people, was opened. There he preached for the rest of his life. Out of his work grew



Photo: Brown Bros

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CHARLES H. SPURGEON

a system of schools and almshouses, a pastors' college, the Golden Lane Mission, and the Stockwell Orphanage.

Writings. His sermons, marked by simplicity, earnestness, and unfailing humor, were published each week, and reached all English-speaking countries. He also wrote The Saint and His Saviour, John Ploughman's Talks, The Treasury of David, Types and Emblems, and The Present Truth, and edited a monthly magazine, Sword and Trowel.

SPUYTEN DUYVIL, spi' ten di' v'l, CREEK. See New York City.

SPY, in military usage, a term defining any person who abandons the uniform or distinctive badge of his service, in order to mingle with the enemy, for the purpose of obtaining information of value to the army he is serving. It is clearly agreed in international warfare that a soldier in uniform, no matter under

what circumstances he is taken, cannot be considered a spy. Civilians openly carrying messages are not spies, and are not subject to the ignoble death meted out to those who go in disguise, in order to penetrate the enemies' lines. Aviators and balloonists who reconnoiter or "spy out" the position of forces are not spies. A spy is one who acts clandestinely or under false pretenses. To be condemned as a spy, a person must actually be taken within the lines of the enemy, in disguise, or while pretending to be other than what he really is.

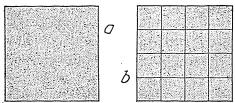
Even a spy must receive trial before punishment. Death by hanging or shooting is prescribed in usages of war for all condemned spies. As an illustration of the status of a spy, the celebrated case of Major André, hanged in 1780, affords a striking example. He was caught within the lines of the United States army, in disguise. Not being in uniform, he was not entitled to the treatment due to an honorable combatant. Had he reached the British lines and afterward been captured, although known once to have acted as a spy, he must then have been treated simply as any other prisoner of

The term is also applied in time of peace to those who try to collect information in one country which would be valuable to another country. Special laws deal with such cases.

Related Subjects. The reader is referred to:
Andre, John Hale, Nathan SPY WEDNESDAY. See HOLY WEEK.

SQUADRON, skwad' run, a naval and military term which varies in meaning according to the arm described. In the cavalry, a squadron is under command of a major, and is equivalent to a battalion of infantry. In the Army Air Corps, a squadron consists of from thirteen to twenty-eight planes. A naval squadron comprises four or more vessels, or six or more aircraft, generally of the same type. See ARMY; NAVY.

SQUAM LAKE. See NEW HAY (Location, Size, and Surface Features). See NEW HAMPSHIRE



SOUARES Explanation of figures appears in the text.

SQUARE, a plane figure having four equal straight sides and having four right angles (see a in diagram).

The number of square units in a square is the product of the number of units in the length

and the number of units in the width, as in any rectangle. But since the length and width of a square are equal, the area is found by multiplying one side by itself, or by squaring one side. The square of a number is indicated by placing the exponent 2 to the right and above the figure denoting the number to be squared; thus, $4^2 = 4 \times 4$ or 16. In b of the accompanying illustration, we have a square whose sides are each four units in length. The area is therefore 4×4, or 16, square units.
What is the area of a square city block 600 feet

long?

One side = 600 ft. Area in sq. ft. $=600^2 = 360000$

When the area of a square is known, one side may be found.

What is the side of a square whose area is 144 square feet?

The problem becomes: What number multiplied by itself gives 144? It is expressed thus: $\sqrt{144}$ =? The answer, or 12, is called the square root of 144. The problem is expressed thus:

Area of square = 144 sq. ft. 1 side in ft. = $\sqrt{144}$ = 12

The line upon which a square is built is called the base of the square.

Related Subjects. In connection with this discussion of the square, the reader is referred to the following articles in these volumes:

Mensuration Rectangle Square Measure Ouadrilateral Rhombus Square Root

SQUARE MEASURE, the system used in the measurement of surfaces. The name is taken from that of the square, or the unit employed in finding the area of a surface.

Related Subjects. The table of common square measure is given in these volumes in the article DENOMINATE NUMBERS. For applications of the principles of square measure, see MENSURATION.

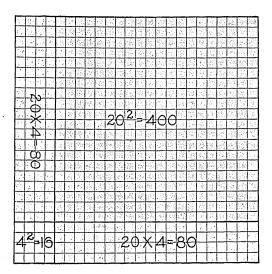
SQUARE ROOT. On a line 4 inches long build a square. The area of the square is 16 square inches. On a line 9 feet long build a square. The area of the square is 81 square feet. On a line 8 units long build a square. The area is 64 square units.

The drawing of many squares on cross-section paper, as suggested above, shows the meaning of a square, and makes clear the relation of the area of a square to one of its sides; namely, the number of square units in the area is equal to the number of units in one side multiplied by itself. This product is called "the square" of the number. "The square" is used to designate the product obtained by multiplying a number by itself, whether or not that product is thought of geometrically as a square. The square of a number is indicated by a little figure called an exponent; thus, $4^2 = 16$; $9^2 = 81$.

The above are read: 4 squared = 16; 9 squared=81; or the square of 4=16; the square of 9=81.

The area of a square is 144 square feet. What is one side? 12 feet.

The area of a square is 169 square miles. What is one side? 13 miles.



Note the relation between areas and sides below.

Area	Side
400 sq. ft.	20 ft.
36 sq. in.	6 in.
49 sq. yd.	7 yd.
Tar so rd.	ıı rd.

Finding the line upon which a square is built, or finding what number multiplied by itself gives a certain square, is called "finding the square root of the number"; that is, finding the line or number out of which the square grows. And, as is usual in mathematics, there is a sign used to indicate what is sought; thus, $\sqrt{25}$ stands for the number which multiplied by itself makes 25. The sign is called the radical sign—root sign.

Find the values of the following:

3 ²	$\sqrt{64}$
5 ²	√6400
1 ²	$\sqrt{144}$
142	V14400
30 ²	$\sqrt{\frac{1}{4}}$
$(\frac{1}{2})^2$	$\sqrt{^{256}}$
(34)2	$\sqrt{25}$
40 ²	V.25
(21/2)2	√.0025
172	$\sqrt{169}$
$(\frac{5}{8})^2$	$\sqrt{225}$

Squaring a Number Consisting of 10's and Units. Square 46.

$$46 = 4 \text{ tens} + 6 \text{ units}$$

$$46^2 = (40 + 6)^2$$

$$40 + 6$$

$$40 + 6$$

$$40 \times 40 + (40 \times 6) + (40 \times 6) + 6^2$$

$$40^2 + 2 \times (40 \times 6) + 6^2$$

$$1600 + 480 + 36 = 2116$$

$$39^2 = (30 + 9)^2 = 30^2 + 2 \times (30 \times 9) + 9^2$$

$$39$$

$$81 = 9 \times 9$$

$$270 = 9 \times 30$$

$$270 = 30 \times 30$$

$$900 = 30 \times 30$$

$$1521 = 39 \times 39$$

The square contains the square of the tens, twice the product of the tens by the units, and the square of the units. This may be put into a more concise form, thus:

 $number^2 = tens^2 + 2 \times tens \times units + units^2$ Many numbers of this class should be squared on cross-section paper by students taking up the subject of square root.

The root is found by taking the square apart along the lines upon which it was built up. In other words, it must be taken apart along its construction lines.

Square Root of Numbers Consisting of ro's and Units. What number squared gives 2025?

$$n^{2} = 2025$$

$$n = \sqrt{2025}$$

$$2025 = tens^{2} + 2 \times tens \times units + units^{2}$$

$$40 + 5$$

$$2025$$

$$1600 = tens^{2}$$

$$2 \times 40 = 80$$

$$425 = 2 \times tens \times units + units^{2}$$

$$400 = 2 \times tens \times units$$

$$25 = units^{2}$$

$$25 = units^{2}$$

$$25 = units^{2}$$

Explanation:

- (1) What is the largest square of tens in 2025? 1600.
 - (2) What, then, is the tens? 40.
 - (3) Place 40, or 4 tens, in the root.
- (4) Subtract 1600; the remainder 425 must contain 2×tens×units+units2.
- (5) Units2, being comparatively small, may be neglected for the time; and 425=2×tens×
 - (6) The tens is 40; and $425=2\times40\times$ units. (7) Divide 425 by 2×40 and find units to
- be 5.
 (8) Subtract 5×80 from 425.
 - (9) The remainder must be units2.
- (10) It is found to be so— $25=5^2$.

When dividing by 2×tens, we must bear in mind that there must be a remainder equal to the units?. The following problem illustrates the point:

√784=n 20 + 8 = 28 $784 = t^2 + 2 \times t \times u + u^2$ $400 = t^2$ $2 \times 20 = 40 \quad 384 = 2 \times t \times u + u^2$ 320 $64 = u^2$ $164 = 8^2$

Note that, when 384 is divided by 40, it seems that the quotient is 9. But upon taking out 9×40, there is not enough left to give units2; the remainder is 384-360 or 24, which is not 92. So we see the quotient is only 8, giving a remainder of 64, which is 82.

Squares of numbers from 10 to 100 have three or four digits; squares of numbers from 100 to 1000 have five or six digits. So the square root of any number of three or four digits lies between 10 and 100; that is, has two digits. The square root of a number of five and six digits lies between 100 and 1,000; that is, has three digits. Therefore, in finding the square root, an integral number is separated into groups of two digits each, beginning at the right. The number of digits in the root is equal to the number of groups; for example, $\sqrt{72'25}$ has two digits, $\sqrt{1'63'84}$ has three digits, $\sqrt{10'49'76}$ has three digits.

A decimal number is divided into groups, beginning at the decimal point, and counting to the left and to the right; for example,

 $\sqrt{2'}$ 07.36, $\sqrt{2'}$ 08.22'49.

The usual concise method of solution is as follows:

$$\begin{array}{r|rrrr}
 & 28 \\
 & 7'84 \\
 & 4 \\
 & 2 \times 20 = 40 \\
 & +8 & 384 \\
 & 48 & 0
\end{array}$$

Here the zeros showing the full value of tens and tens² are dropped, and units when found is added to the "trial divisor" (2×tens) before multiplication, thus including the square of the units in the product. Students taking it up in arithmetic will more easily understand the first method given here.

Square Root of Numbers of More than Four Digits. Find the square root of 104976.

$$\sqrt{104976} = n$$

$$300 + 20 + 4 = 324$$

$$104976$$

$$900000t^{2}$$

$$2 \times 300 = 000$$

$$14976$$

$$12000 = 2 \times t \times u$$

$$2976$$

$$400 = u^{2}$$

$$2 \times 320 = 640$$

$$2576$$

$$2560 = 2 \times t \times u$$

$$16 = u^{2}$$

$$16 = 4^{2}$$

After 320 is found, we know there are 32 tens in the root, and after taking out 202, or 400, we proceed to find units. The process is shortened below:

$$\begin{array}{r}
324 \\
\hline
10'49'76 \\
9 \\
2 \times 30 = 60 & 149 \\
\underline{2} & 62 \\
2 \times 320 = 640 & 2576 \\
\underline{4} & 2576 \\
\underline{644}
\end{array}$$

Square Root of Decimal Numbers. (1) A product contains as many decimal places as the two factors that make it.

(2) The square is a product and the factors are equal.

(3) Therefore a square always has an even number of decimal places, and the root has one-half as many decimal places as the square.

(4) To find the square root of a decimal number, (a) work as if it were an integer; (b) point off one-half as many decimal places in the root as there are in the square.

Note that .625 has but three decimal places; add one place, so that it has an even number of decimal places.

A root is carried out as many decimal places as desired, by annexing two decimal zeros to the square for each decimal place desired in the root; for example, find $\sqrt{3}$ to two decimal

A method preferred by many rests on the obvious fact that, if a number is divided by its square root, the quotient must equal the divisor. Hence, to find the square root of a number, make as shrewd a guess as possible at the result, and divide the number by your guess. If the quotient is equal to your divisor, the desired square root is found. If the quotient is larger (smaller) than the divisor, your guess was too small (too large). Repeat the

process with a new divisor between your original one and the original quotient, until divisor and quotient become equal.

For example, find $\sqrt{682}$. The square root is clearly between 20 and 30. Let us try 25. $682 \div 25 = 27.2 +$. The desired square root is between 25 and 27.2. Let us try 26.1, half-way between 25 and 27.2. $682 \div 26.1 = 26.1 +$. Hence, to one decimal place, $\sqrt{682} = 26.1$. The process can evidently be carried to as many decimal places as may be desired.

J.W.Y.

SQUASH, a plant of the gourd family, cultivated for its fruit. It is a familiar and well-liked garden vegetable. Squash is cooked in

various ways. It is most commonly served in the same way as mashed potatoes, or used as filling for pies. The plant grows as a trailing vine and as a bush, and bears large green leaves with many lobes, and large, tubular,

orange-yellow flowers. There are two general kinds, the summer and the winter. Summer varieties, represented by the simling and the crookneck, usually grow as bush plants. The fruits are usually smaller than winter varieties, and the plants have hard, dense stems. Summer squash will grow in the shade of cornstalks or in a sunny situation, and will endure both heat and drought, as this type adapts itself readily to almost any condition. A summer squash is gathered and eaten before fully

Winter varieties, represented by the *Hubbard*, are usually vine plants. The fruits are heavy and thick-skinned. They are allowed to come to maturity, but must be gathered before frost injures them; if stored in a dry place, they will keep through the winter. The best-liked varieties retain their green color when ripe. Squashes do best in a soil containing a good deal of humus. Bush varieties are planted in hills about four feet apart each way, but trailers need more space.

Squash Bug, an ill-smelling insect that attacks both squash and pumpkin vines. It is slightly more than half an inch long, and is brownish-black above and dirty yellow below. Adult insects sleep through the winter. The eggs are laid in the spring on young leaves and sprouts, and the young hatch in about two weeks. They injure the growing plants by sucking the sap. There are several measures used to combat the pest. One of these is picking the bugs off the

vines before the eggs are laid. Young plants should be protected by means of frames covered with mosquito netting. Bugs can be trapped under shingles placed about the vines, and can then be destroyed. Any egg clusters found should be crushed. B.M.D.

Scientific Name. Squashes belong to the family Cucurbitaceae and the genus Cucurbita.

SQUATTER. See SQUATTER SOVEREIGNTY (Origin of Terms).

SQUATTER SOVEREIGNTY, OR POPULAR SOVEREIGNTY, in the history of the United States, was the doctrine that the inhabitants of a territory had the right to regulate their internal affairs without interference from the national government. The origin of

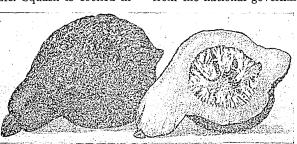
this theory is unknown, but it was Lewis Cass (December, 1847) who first publicly proclaimed it, in the suggestion that the territories be allowed "to regulate their internal concerns in their own way."

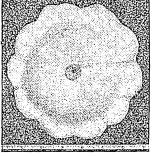
The theory first found application in the problem of the extension of slavery into the territory acquired from Mexico. The North, as a whole, was opposed to the extension of slavery into the territories, while the South was almost unanimous in its favor. Both North and South were inclined to regard the theory of squatter sovereignty as a happy solution which relieved the states and Congress of a difficult problem.

In the Compromise of 1850, the principle seems to have been recognized, because of the omission of reference to slavery in

Utah and New Mexico; and in the Kansas-Nebraska Bill of 1854, it was expressly adopted as a basis. Soon afterward, however, the doctrine was repudiated by the South, which declared that Congress had no jurisdiction over slavery in the territories. In the election of 1860, the dispute caused a split in the Democratic party, the Northern wing nominating for President Stephen A. Douglas, who had been for ten years the foremost advocate of popular sovereignty. The Southern wing, demanding that Congress take vigorous action to defend slavery in the territories, nominated John C. Breckinridge. With the close of the War of Secession and the abolition of slavery, the question lost all political significance.

Origin of Terms. The terms squatter sovereignty and popular sovereignty originally had different mean-





SQUASHES

Above, the warted Hubbard squash, showing exterior and longitudinal section. Below, a mountain white bush squash.

ings, and their confusion in United States history is unfortunate. A squatter was a settler who occupied land without having acquired legal title to it, and the old doctrine of "squatter sovereignty," dating from colonial times, gave him legal title, after a certain period of years, if the rightful owner did not appear and enter a protest. Thus the name squatter sovereignty came into more general use than the correct term, popular sovereignty, or sovereignty inhering in the people.

Related Subjects. The reader is referred in these volumes to the following articles:

Compromise of 1850 Douglas, Stephen A. Kansas (History)

Kansas-Nebraska Bill Political Parties Slavery

SQUAW MINT. See PENNYROYAL.

SQUID, skwid, a sea mollusk having an internal shell and ten movable arms about the mouth. The common squid, which inhabits the coast waters from Maine to South Carolina, is typical of the family. It has a long, pointed body, with two fins at the posterior end, united at the back. Two of its ten arms are longer than the other eight, but all have rows of sucking organs. It has a large head, and a mouth equipped with two horny jaws and a rasping tongue. The body of the squid is spotted with several different tints, and it can change its color at will to correspond with its environment. Like others of its family, it has an ink bag from which it ejects a dark fluid to discolor the water when fleeing from an enemy. Aided by their sucking discs and movable arms, the squids successfully prey on small fish, and they themselves are eaten by fish, eels, dolphins, and sea birds.

The common squid is from eight to twenty inches in length, but there are giant specimens off the Newfoundland coast, with bodies from eight to ten feet long and tentacles attaining a reach of forty feet. Sailors tell nearly unbelievable stories of squids having sucking discs as large as dinner plates.

Classification. Squids belong with the nautilus, octopus, and cuttlefish in the class Cephalopoda of the subkingdom Mollusca. The common squid is classed as Loligo pealii, family Loliginidae.

SQUILL, the name of several plants with bulbous roots, belonging to the lily family. A species known as the sea onion, which grows in countries around the Mediterranean, produces bulbs sometimes weighing four pounds and of medicinal value. They are collected in August. The outer husk is removed, and the bulb is sliced and dried in the sun. The drug made from these bulbs is generally used in the forms of syrup and the tincture of squill. It stimulates the heart and has decidedly irritating qualities, affecting particularly the stomach, intestines, and bronchial tracts, and for this reason it cannot be given alone. Squill is sometimes used in chronic bronchitis, but never in the acute disease. Its use is decreasing, be-

cause its irritant qualities overbalance the good it may do.

Scientific Name. Squill belongs to the family Liliaceae. Its botanical name is Urginea maritima.

SQUINT, OR STRABISMUS, stra biz' mus. Under normal conditions, the two eyes can be directed toward an object with the same axis of vision. There are six muscles which make this possible—attached above and below and on each side of the eyeball. Injury to one or more of these muscles causes the affected eye to turn out of its normal position. Sometimes both eyes are affected. That form of squint is most common in which the eye or eyes seem to be looking at the nose. Neglect of such conditions often causes blindness in one or both eyes. Wearing correct glasses helps in many cases. Even very young cross-eyed children should be fitted with proper glasses. Sometimes the defect is corrected by operation, but the best procedure in each case must be determined by a competent eye specialist. Because of the great advance made in recent years in the treatment of eye troubles, squint is much less common than formerly. See

SQUIRE, OR ESQUIRE, the second step toward knighthood (which see). See, also, CHIVALRY.

SQUIRREL, skwur' el. Squirrels are among our most interesting and popular forms of wild life. They are a group of rodents, or gnawing

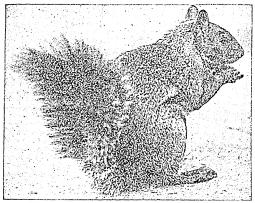
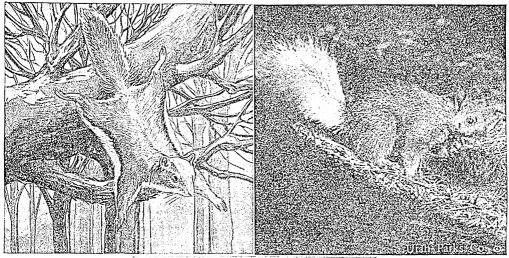


Photo: U & U

"OSWALD" WAS IN DISGRACE

He is one of the animal pets in Lincoln Park, Chicago. A friendly interest in him led one of the keepers to find out how he was prepared for the coming winter. His nest was searched, and in it thirty-two golf balls were found. It was learned that it was Oswald's habit to visit the golf links soon after daylight in search of the balls, which he carried to his winter quarters. The photograph shows him as he appeared before his accusers.

animals, that live in trees or under the ground, and are found in woodlands in nearly all parts of the world. Australia is the only continent from which they are absent. Squirrels are



graceful, agile animals with long, plumelike tails and somewhat slender bodies. Some are but a few inches in length, and others are as large as a full-grown cat. Their color ranges from black through reddish-brown to gray. The habits of the typical squirrel are suggested in these lines from Mary Howitt's popular poem:

In the joy of his nature he frisks with a bound To the topmost twigs, and then to the ground; Then up again, like

winged thing, And from tree to tree with

queer,

As if he would say, "Ay, follow me here!"

And then he grows pettish, and stamps his foot; And then independently cracks his nut; And thus he lives the whole summer through, Without a care or a thought of sorrow.

Squirrels do take thought of the future, however, for they store away nuts to last them through the winter.

There are so many species, and varieties within the species, that no accurate count of the number of kinds of squirrels has been made. Some of the more important species are as

Red Squirrel, or Chickaree. Ranging from Northern United States to the tree limit in Canada, the red squirrel is the most widely



THREE OF THE SQUIRRELS

And from tree to tree with a vaulting spring;
Then he sits up aloft, and looks waggish and gueer.

Upper left, the flying squirrel. At right, the white-tailed Kaibab squirrel, found only on the plateaus north of the Grand Canyon of the Colorado; it is about the size of the fox squirrel. Below, the California ground squirrel. fornia ground squirrel.

American species. is an active little creature, not over eight inches long, excluding the bushy tail. Its upper parts are chestnutred, the lower parts white, and there is a black stripe along each side. The ears have on the tip a tuft of hairs. This squirrel lives almost entirely in trees, seeking a home in a hollow trunk or making a special nest of leaves and twigs. Its favorite diet of nuts and grain is varied by birds' eggs, young birds, insects, fruits, and tender twigs. Red squirrels keep up a shrill, noisy chattering. Their young, of which there are three or four

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distributed of several

to a litter, are born in the spring.

Gray Squirrels. There are a number of species of gray squirrels in America. One of the commonest ranges from New England west to Minnesota, and is hunted in the East, both for its skin and its flesh. This squirrel is ten inches long. Like the red squirrel, it eats the young and eggs of birds, but is less prone to this bad habit than its smaller brother. One of its means of escaping the notice of its own enemies, particularly the hawk, is to flatten out on the side of a horizontal branch; in this position, its gray-coated body is even more inconspicuous than usual. Gray squirrels have a habit of calling to one another by "barking, or uttering a series of sounds that end in a sort

of snarl, often distinctly audible for an eighth of a mile. They are often seen in city parks, where they become so tame that they sometimes climb on the shoulders of passers-by. There are other species of gray squirrels in the southwestern part of the United States and in California.

Fox Squirrels. The fox squirrels are larger and handsomer than any of the species mentioned above. They are found in the Middle states and in the South. Some are jet black, others reddish-gray, and there are others with colors ranging between these shades.

Other Kinds. In Europe there is a common squirrel which ranges all over the continent. It is colored like the chickaree, but is somewhat larger. The squirrels of the tropics are noted for their brilliant coloring, and there is an Oriental species which changes its gray coat for one of bright orange-yellow in the breeding season. This is the only known mammal which has a variation of color corresponding to the changes in the plumage of birds.

There are two other interesting groups of squirrels, namely, those that live in burrows in the ground, and those that leap from tree to tree, as if flying.

W.N.H.

Scientific Names. The squirrel family is known scientifically as *Sciuridae*. The red squirrel is *Sciurus hudsonicus*; the common gray, *S. carolinensis*; the fox squirrel of the Middle states is *S. niger rufiventer*; that of the South is *S. niger*.

SQUIRRELTAIL GRASS, a name frequently applied to WILD BARLEY (which see).

SRINAGAR, sre nah gur'. See India (The Cities).

STABLE EQUILIBRIUM. See the article Gravity, Center of.

STABILIZER, AIRPLANE. See AIRCRAFT.

STACK, SIR LEE, former Governor-General of the Sudan in Egypt. See Egypt (Egypt a Kingdom).

STADACONA, stah dahk' o nah, an Indian town where now stands the city of Quebec. See QUEBEC (History).

STADIUM, sta' dih um, originally, the footrace course in Olympia, Athens, and other places in Greece where athletic contests were celebrated. The name in modern usage refers to a great uncovered structure, with seats arranged in tiers, from which spectators view football and baseball games, track meets, and other sports and contests. Universities, in particular, are more and more erecting these huge stadiums for athletic games. In many cases, they have been financed by students and alumni as memorials to those who gave their lives in the World War. The magnificent structure on the lake front at Chicago is an example of a municipal stadium.

The following table gives the names and seating capacities of the twenty-two largest stadiums of America:

NAME AND LOCATION	SEATING CAPACITY
Soldier Field Municipal Stadium, Chi-	
cago, Ill	125,000
Sesqui-Centennial, Philadelphia, Pa	125,000
Los Angeles Coliseum, U. of So. Calif	105,000
California Memorial Stadium, U. of Calif.,	
Berkeley, Calif	90,000
Stanford (Univ.) Stadium, Stanford U.,	
Palo Alto, Calif	88,000
University of Michigan Stadium, Ann	
Arbor, Mich	87,247
Yale Bowl, Yale U., New Haven, Conn.	80,000
Rose Bowl, Pasadena, Calif	80,000
Venable Stadium, Baltimore, Md	78,000
Municipal Stadium, Cleveland, O	78,000
Franklin Field, U. of Penn., Philadelphia.	76,000
Ohio Stadium, Ohio State U., Columbus, O.	75,000
Pitt Stadium, U. of Pitts., Pittsburgh, Pa.	75,000
Yankee Stadium (Baseball), New York	
City, N. Y	71,699
Memorial Stadium, U. of Ill., Urbana, Ill.	70,000
Kezar Stadium, San Francisco, Calif	62,000
Stagg Field, U. of Chi., Chicago, Ill	60,000
Comiskey Park (Baseball), Chicago, Ill	60,000
Harvard U. Stadium, Cambridge, Mass.	55,000
Dyche Stadium, Northwestern U., Evan-	
ston, Ill	55,000
U. of Minn. Stadium, Minneapolis	55,000
U. of Notre Dame, Notre Dame, Ind	55,000

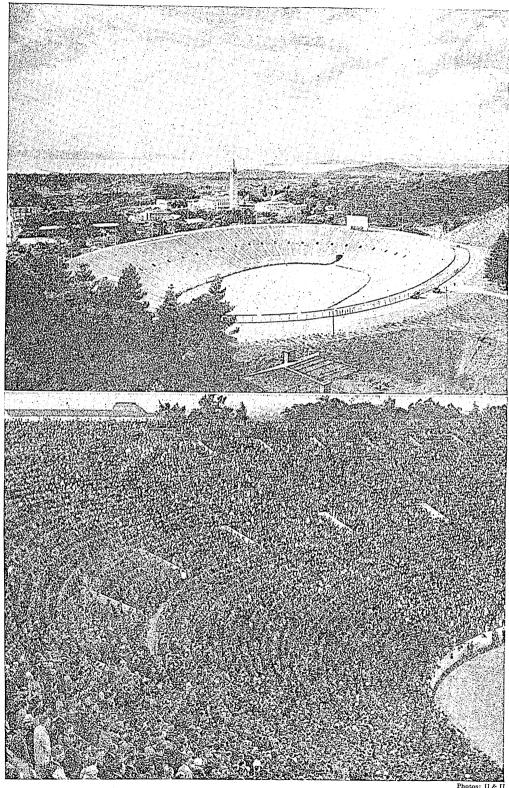
The famous stadiums of ancient Greece were usually enclosed by terraces having the general shape of a horseshoe, which afforded the spectators a clear view of the field. Occasionally, these terraces had seats. The ancient stadium at Athens has been restored, and served as the scene of the Olympian Games in 1906 (see page 5197).

The stadium was also a measure of distance among the Greeks. It was the distance between the terminal pillars of the stadium at Olympia, and was the equivalent of 606 feet 9 inches, in English measurement.

STADTHOLDER, staht' hohl dur. See NETHERLANDS, THE (History).

STAËL-HOLSTEIN, stah' el hohl' stine, ANNE LOUISE GERMAINE (1766-1817), generally known as MADAME DE STAEL, a French writer, daughter of Jacques Necker (which see). She was by nature an unusually bright child, and her association with the brilliant people who frequented her father's house increased her interest in intellectual matters and in the affairs of the times. At the wish of her parents, she married the Swedish minister, Baron de Staël-Holstein, who was much older than she, and with whom she was far from happy. The marriage terminated in a friendly separation, and Madame de Staël continued to live an independent life.

In 1788 she published her Letters on Jean Jacques Rousseau, a very enthusiastic comment, and in various ways showed her approval of the sentiments and events of the early



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Outlets for Football Enthusiasm. Above, the stadium of the University of California; it is typical of stadiums of the bowl type. Below, a photograph of a small section of the great crowd at an intercollegiate football game.

months of the Revolution. Later, however, when she felt that the reformers were becoming extreme, she was active in defense of the royal

family, and carried her advocacy so far that she was obliged to flee from the country. She returned in 1794 to Paris, but nine years later was ban-ished by Napoleon, who was suspicious of her motives. During the years of her exile, she visited Germany, and there became acquainted with the greatest literary men of the time, including Goethe, Schiller, and Schlegel.



madame de staël

Place in Literature. Her works of importance, in addition to the volume referred to above, include the novels Delphine and Corinne, once very popular but now comparatively little read; Literature in Its Relation to Social Institutions; On Germany; and Thoughts on the French Revolution. More important than any single work was her influence in bringing a liberal cosmopolitan spirit into France, which up to that time had never freed itself from classic formalism. In this great movement, she may be regarded as the foremost figure, and is thus ranked as one of the notable literary personalities of France.

R.T.H.

STAFF, an inexpensive compound resembling plaster and used instead of stone for temporary buildings, architectural decoration, and statuary. It consists chiefly of plaster of Paris and hydraulic cement, mixed in water with dextrin and glycerine. Staff was first used as a covering for buildings of the Paris Exposition in 1878, and it was extensively employed on the buildings of the World's Columbian Exposition at Chicago, in 1893; of the Louisiana Purchase Exposition at Saint Louis, in 1904; and of the Sesqui-Centennial Exposition at Philadelphia, in 1926. Considerable staff was used at the New York World's Fair and the Golden Gate Exposition, San Francisco, both held in 1939.

STAFF. See Music (A Lesson on the Staff). STAFF, General. See General Staff. STAFFA, Island of. See Fingal's Cave.

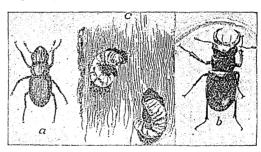
STAG, the male of the red deer, the common deer of Europe. A full-grown stag is a handsome animal, standing about four feet high at the shoulder, and with branching horns three feet in length. Hunters find the pursuit of this noble animal a very thrilling sport, as it is fleet of foot, a skilful swimmer, and possessed of keen sight and hearing. The opening canto of Scott's Lady of the Lake, which contains a spirited account of a stag hunt, describes a characteristic of the animal in these lines:

As Chief, who hears his warder call, "To arms! the foemen storm the wall," The antlered monarch of the waste Sprang from his heathery couch in haste. But, ere his fleet career he took, The dewdrops from his flanks he shook, Like crested leader proud and high, Tossed his beamed frontlet to the sky.

The North American wapiti, or elk (which see), is closely related to the stag. The name stag is also applied in a general way to males of other species of deer (see DEER). W.N.H.

Scientific Name. The stag belongs to the family Cervidae. Its scientific name is Cervus claphus.

STAG BEETLE, the name of a family of beetles in which the males of certain species have odd hornlike processes on the mandibles, not unlike the horns of a stag. In some cases, these projections are nearly as long as the body of the insect. Common American species include the giant stag beetle of the Southern states, with mandibles an inch long and body one and one-half or two inches; and the pinching bug of the Eastern states, an insect that flies by night. The adult stag beetles live in trees and



THE STAG BEETLE
(a) Female; (b) male; (c) grubs.

feed on sap and on honeydew. The eggs, deposited in crevices of the bark, hatch into soft, white worms (larvae). See BEETLE. W.I.S.

Classification. The stag beetle family is Lucanidae.

STAG-BUSH. See BLACK HAW.

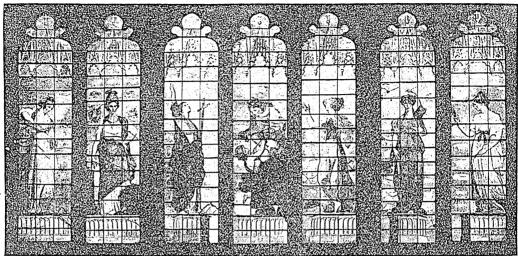
STAGECOACH. See Trails OF Early Days; illustration, page 5983.

STAGHOUND, a large, white hound with black-and-tan markings, probably descended from the bloodhound. Its head resembles that of a pointer, but the neck is heavier, the ears more hanging and set lower. As the name indicates, these dogs are used for hunting red deer, the male of which is called a stag. Staghounds are found almost exclusively in Europe, and even there they are rapidly being replaced by the foxhound (which see). The staghound is not a recognized distinct breed. See, also, Dog.

STAINED GLASS, in reality, is glass stained by chemical process, but the name is also applied to glass which is painted or otherwise



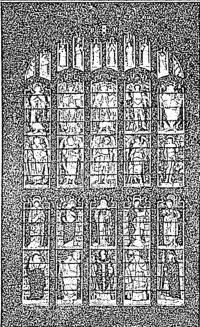
The Stag at Bay. A reproduction of one of Landseer's most notable animal paintings. (See page 6702.)



colored, particularly such glass as is used in what are known as stained-glass windows. In medieval windows of this kind, the color was actually incorporated in the glass by a mixing process in the making of the glass itself. This was called "pot metal." Medieval windows were a patchwork of different colored pieces of glass, made into shapes required by the design of the window, and put together in much the same way as a colored picture puzzle. The pieces of glass were genererally held together by strips of lead, soldered together at intervals. The stained glass of medieval days was not made, as it is now, in large panes.

The United States leads the world in the manufacture of stained glass, and the excellence of the product is largely due to the efforts of John La Farge (which see) and of Louis B. Tiffany of New York. The processes of manufacture have greatly

changed, and it is now easy to obtain effects such as were absolutely impossible with older methods. It was only at the end of the nineteenth century [that the art of glass-staining assumed commercial importance in America. Previous to that time, all stained glass was imported, and but poor imitations of the real art could be obtained. The American artists took up glass-staining at the point where the medi-



OF GREAT ARTISTIC MERIT

Above, the famous window in the chapel of New College, Oxford University, England, designed by Joshua Reynolds. Below, window in the chapel of Jesus College, Cambridge University, England, designed by Burne-Jones.

eval artists ceased to develop it. Modern stained glass is superior in effect, coloring, and design. See Glass (Colored Glass).

STAINLESS STEEL, a steel made with chromium (which see) as an alloy. It is practically immune to rust and corrosion of any kind. Nickel-chrome stainless steel, using both nickel and chromium as alloys, is a very tough, non-corrosive alloy, used for chemical processing equipment.

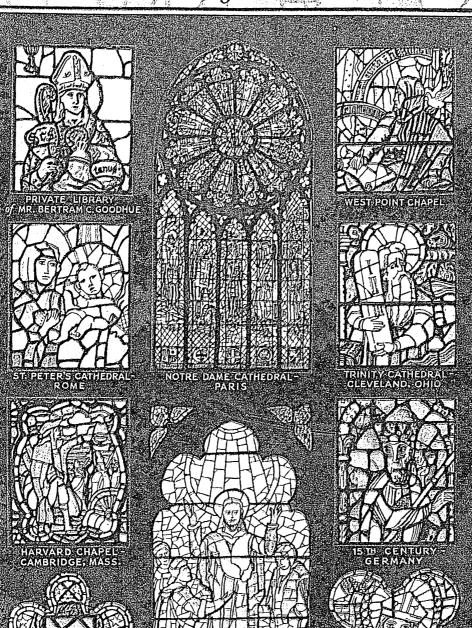
STAKED PLAIN. See NEW MEXICO (The Land). STAKE-DRIVER. See

BITTERN.

STALACTITES AND STALAGMITES, sta lak'-tites, sta lag' mites, curious and beautiful deposits, ordinarily of calcite, formed in caves and sometimes under stone bridges and arches. Water, percolating through pores and crevices in limestone, takes some calcium carbonate into solution. When it emerges into a cave, and drips from the roof or

trickles down the walls, it evaporates and deposits the dissolved material. Stalactites hang from the roof and are formed like icicles, which they resemble; stalagmites, which rise from the floor like inverted icicles, are built up by evaporation from the water falling from above. Sometimes the two forms join in columns and clusters; fantastic curtains and flutings are also formed by water flowing down the walls.

THE SPLENDOR OF STAINED GLASS











Similar deposits, formed of ice, are common in the ice caves of the Polar regions, and glistening black stalactites of basalt hang from the roofs of some lava caverns.

LLAF.

Related Subjects. See the following articles:

Basalt Limestone
Carlsbad Caverns Luray Caverns
National Park Mammoth Cave
Cave Wyandotte Cave

STALAGMITES. See foregoing article. STALIN, stahl' in, JOSEPH V. (1879-), Premier, Marshal, and Secretary-General of the Central Committee of the Communist Party of the Soviet Union. He is a powerful dictator whose forceful methods have justified his name, meaning "the man of steel." He is also a farsighted statesman, whose interest in the welfare of the Russian masses has been one of the chief reasons for giving him such high authority.

The son of a cobbler, Stalin was born in Tiflis, Georgia, and, prior to the days when his political activities caused him to change his name, was known as Iosif Vissarionovitch Dzhugashvili. While attending the seminary of the Orthodox Church in Tiflis, he was revolted by the methods with which the czarist government

tried to use the priests as tools of its despotic regime, and joined the Russian Social-Democratic Workers' Party. After 1000 he was a professional revolutionist, fomenting strikes and demonstrations. He founded such underground publications as Pravda (The Truth). Social-When the Democratic Party



JOSEPH V. STALIN

split into left and right wings, called Bolshevik and Menshevik, he became leader of the Transcaucasin Bolsheviks. He was first arrested and exiled to Siberia in 1902. During the next decade he escaped from exile five times, and prior to his sixth arrest in 1913 was the leader of the small group of Bolshevik deputies elected to the Duma (which see).

When the revolution of the moderate Socialists in March, 1917, freed all political prisoners, Stalin returned to Petrograd (now Leningrad), where he prepared the way for Lenin's return and, in the following November, helped drive Premier Kerensky from power. He became a member of the Central Executive Committee of the Soviet Government, and during the next two years took an active part in the civil war between the Bolsheviks and anti-Bolsheviks. After serving as People's Commissar of Nationalities, he was chosen general secretary of the Central Committee of the Communist Party in 1922.

Intent on building socialism in one country,

rather than like Trotsky trying to foment a world revolution, Stalin suggested his plan of industrialization in 1925. In 1928 he became the driving force in carrying out the first of the three Five-Year Plans, and also formulated the policy of collectivization, which placed agriculture on a more efficient basis. He urged the Russians to prepare for possible attack by Germany or other capitalist nations. Although the signing of a nonaggression pact with Hitler in August, 1939, baffled many of his followers, when Germany invaded the Soviet Union in June, 1941, it was realized that he had taken this step so that the country might be better prepared in case of war.

Stalin became premier (or chairman of the Council of People's Commissars) in 1941. As People's Commissar of Defense, he assumed supreme command of the Red Army and Red Fleet in 1942. In 1943 he helped bring about the dissolution of the Comintern (Third International). See Communism; Russia; World War II (The Russian Campaign).

STALINABAD. See Russia (Principal Cities). STALINGRAD. See Russia (Principal Cities); WORLD WAR II (The Russian Campaign).

STALWARTS, the politicians who fought for the third-term nomination for U. S. Grant for President of the United States. See Garfield, James Abram (Election of 1880).

AND STANDARD TO THE TAXABLE OF THE STANDARD STAND

STAMBOUL, *stahm buhl'*, the Mohammedan quarter of Constantinople (which see).

STAMEN. See Flowers (Parts of a Flower). STAMFORD, CONN. See CONNECTICUT (back of map).

STAMFORD BRIDGE, BATTLE OF. See HAROLD, OR HARALD (III, NORWAY).

STAMMERING AND STUTTERING. These terms are used somewhat interchangeably in describing disordered speech. More correctly, stammering means hesitation in speech, with some tendency to repetition of words or sounds, and some tendency to wrong pronunciation. Stuttering refers to hesitations in which there is some spasm of the mouth muscles, and, at times, grimacing, due to contractions of the muscles of expression. Many persons have these speech defects as the result of idiocy, imbecility, or other serious mental defects. Treatment in such cases is without results. More frequently, however, defective speech appears in children of good mental development, but lacking somewhat in emotional stability. There is no physical abnormality.

The development of a speech disorder is somewhat as follows: A nervous child develops the habit of speaking rapidly, and may be enunciating somewhat differently from the prevailing custom. He may repeat words or sounds. These peculiarities are evident especially when the child speaks rapidly or when excited. If the child becomes aware of his peculiarity, the disorder is made worse. If he

falls into a condition of panic, he is apt to develop the spasm features and the grimaces which mark some cases of stuttering. Stutterers commonly sing without any speech disorder. This condition is due to two factors.

In the first place, the words and the air are known, and no mental process except simple memory is required to repeat music. In the second place, the rhythm makes the muscle development of word- and sound-making proceed mechanically. Stutterers recite poetry almost as readily as they sing, and, for the reasons given, they recite prose with a little greater tendency to stuttering, because they no longer have rhythm to help them out. They think out loud when by themselves, with somewhat more tendency to speech disorders. The maximum of the disorder is reached when they must speak in public, extemporizing as they go. In these circumstances, every force making for speech defect may be in operation: self-distrust, panic, fear, self-centering, necessity for thinking a line of thought, of hearing, understanding, replying, and of translating words into acceptable speech, all operating

simultaneously.

Treatment. Treatment is a matter of training the mental process and the emotions. Training in the formation of sounds has practically no place in stuttering. The training consists principally in teaching poise, self-confidence, courage, self-forgetfulness, and how

to synchronize thought and speech.

These principles are applied to the treatment of stuttering in young children, but in those cases it is even more important that the child should not have his attention called to his defect. A readjustment and a slowing-down of the rhythm at which he moves and talks, stimulated by the example of even movements and calm, low voices about him, are necessary if he is to outgrow the habit.

W.A.E.

STAMP, a small adhesive paper, printed or embossed, and authorized by law, which when affixed to papers or documents furnishes evidence of compliance with revenue laws. If the government requires a tax of \$r\$ on a certain real-estate deed, for example, there must be affixed to that deed some evidence of payment of the fee. A revenue stamp, with an indicated value of \$r\$, pasted upon the face of the document, is proof that the tax has been paid. Such is the extent of the service performed by stamps of this nature.

Stamp duties were first imposed by the Dutch in 1624. In England the plan was first resorted to in 1694, to raise money for carrying on a war with France. The subject of stamps attesting payment of taxes is of great historical interest to the United States; it was the passing of the Stamp Act of 1765, by the English Parliament, that led directly to the Revolutionary

War.

In 1862 the Congress of the United States passed its first law requiring that stamps, especially prepared for the purpose, should be affixed to legal papers and documents, and to packages of many different kinds of merchandise. This was done to raise funds to pay in part the expenses of the War of Secession, and the law was repealed when the necessity was removed. Again, in 1898, a similar law was passed, on account of the war with Spain, and again, twenty years later, to meet a part of the vast sums expended in the World War. These stamps, called internal-revenue stamps, are now required on tobacco, cigarettes, liquors, etc., and on such articles as oleomargarine, snuff, opium, and a great variety of other commercial products, many of them classed as luxuries.

The form of stamp with which people of all countries are most familiar is the postage stamp.

Related Subjects. The reader is referred in these volumes to the following articles:

Internal Revenue Postage and Postage Stamps Stamp Act Tax and Taxes

STAMP ACT. The growing prosperity of the colonies in America, and the increasing debt of the mother country, induced the British







USED UNDER THE STAMP ACT
Three of the stamps which the British government imposed on the American colonies.

Ministry, in 1764, to attempt to raise revenue in America. The purpose was in part to meet home expenses, and partially to make the colonies self-sustaining. In March, 1765, the Stamp Act was passed, imposing a stamp duty on all commercial papers, legal documents, and newspapers. Although the colonies had signified their willingness to raise money to assist in paying the debt incurred by England in the French and Indian Wars, they denied that Parliament had the right, arbitrarily, to impose a tax upon them, since they were not represented in that body. Therefore the publication of the act "operated in America like a spark dropped on a tinder," although the cost of each stamp was trifling.

Patrick Henry denounced the British government and influenced the Virginia assembly to pass resolutions against taxation by Parliament; and, at the request of Massachusetts, a congress in which nine of the colonies were

represented, the first colonial congress in America, met in New York and drew up a statement of the position of the colonies. This was called the Stamp Act Congress. Though the act was repealed in March, 1766, the right to tax the colonies was reiterated. See Revolutionary War in America (Causes); United States (History); Stamp.

STAMP-COLLECTING. See POSTAGE AND POSTAGE STAMPS, subhead.

STAMP WEED, another name for Indian mallow (which see).

STANDARD COINS. See Money, table of coins.

STANDARDIZATION IN INDUSTRY, a characteristic of modern industrial practice, which consists in conforming to an established weight, measure, size, or other standard, for the sake of economy and ease of manufacture. These standards may be fixed by law, or by common consent and cooperation of the producers. Mass production, a conspicuous feature of American industry, is made possible by this conformity to rule.

In its simplest sense, establishing a standard means setting up some measure by which the form or quality of a product may be judged by the consumer or determined by the manufacturer. The growth of industry in the United States, following the industrial revolution and the introduction of the factory system, resulted in dozens of products for every need, all of them differing in appearance and quality, and all made by differing processes. With no definite standard for horse power, for example, a machine might advertise its pulling power at fifteen horse power, and differ in performance by twenty-five per cent from another machine advertising the same rate. There was nothing to deter a pharmacist from adulterating a drug, if it was not at once noticeable to the When railroad companies began consumer. laying tracks, there was no standard for width between the rails, with the result that cars of one company could not travel on the tracks of another. One can imagine the inconvenience that would have resulted had the standard gauge not been adopted; to-day, vast numbers of freight cars are sent all over the country on rails which have exactly the same gauge.

Inconveniences of this sort are not eliminated, however, for it was said that, until after 1925, more than 600 styles of fire-hose couplings were made; one railroad had to carry more than twenty different adjustments and sizes of couplings, in order to connect its fire-fighting apparatus with the water mains in those cities where it had property to protect. The adoption of the metric system of measures internationally would eliminate much waste now existing.

The Growth of Standardization. Food and drug qualities, some years ago, came under

government control, because they affect individual health; some measures which were universally employed were also made standard. Duplication and industrial waste, however, had to be attacked by the manufacturers themselves.

Naturally, the first attempts at standardization were made by various trade associations and manufacturers, to establish standards for their own products. An example is the association of the various cement manufacturers of the country; when it was discovered that, among the hundred manufacturers, nearly ninety different specifications for portland cement were in use, specifications for a standard product were adopted. Now manufacturers of portland cement contribute to an organization which maintains a large research staff and laboratories to improve the quality of cement and concrete, and find new uses for them.

Coöperation within single industries led to standardization in larger groups, applying to a number of related products. Standard qualities for steel, for example, are of great importance to a manufacturer who uses steel as raw material for his product. As a central agency for this related standardization, there was formed in 1918 the American Engineering Standards Committee, representing the Chamber of Commerce of the United States, trade associations, and other such organizations. This body tries to secure the greatest industrial efficiency, "by singling out specific products and materials, in settling upon their properties and dimensions, and in concentrating on them both in production and in use."

THE STATE OF THE S

The committee concerns itself with all of the fields in which standardization in industry is possible. They include names, that is, definitions of technical terms and standard abbreviations and symbols, and a definite endeavor to standardize the widely varying radio terms; uniformity in dimensions of machine parts and supplies, for the sake of making them interchangeable; specifications of quality in cement and other products; methods of testing and ratings of machinery for durability, strength, etc.; safety provisions; and concentration upon the best quantity of types, sizes, etc., of products.

One of the best examples of standardization which may be observed is that in the automobile industry. A committee instructed to set up standards for uniform sizes and parts, quality of fittings and material, and standards of strength, etc., was appointed by the American Society of Automotive Engineers in 1910. The use of these specifications by most of the industry has made mass production possible, with lower cost to producer and consumer, and standards of strength and durability give the consumer his measure of quality. The famous speed of production in the Ford automobile

plant would be impossible if it were not that each part is made to fit exactly, according to a rigid standard, so that no time needs to be lost in adjustment of materials or machinery.

The World War, with its demands for great quantities of munitions, ships, railway cars, etc., accelerated the process of standardization. These orders could not be filled in single factories; the work was divided, each factory handling special parts, which were brought together and assembled for shipping at a central plant. Parts had to fit together so that they could be assembled speedily; this meant that they had to be made according to an exact standard, which was supplied to the factory. Hardly a great American industry fails to apply standardization to all of its tools and processes, and to its raw materials. A glance through magazine advertising will show that this specialization did not disappear at the close of the war, for the raw materials of which automobiles, for example, are made, are themselves standardized-trade-marked products, car bodies, parts, fittings, etc.

A third important agency working for standardization is the United States Department of Commerce, through its Division of Simplified Practice. This bureau assists trade organizations to unite in reducing duplication and waste in their products, chiefly by the elimination of unimportant varieties of merchandise. Much has already been accomplished in the reduction of non-essentials. In so specialized a field as that of men's collars, it was found that 120 different styles were being made, many differing only slightly; the manufacturers reduced this number to about twenty-five. Of the 125 forms, sizes, etc., of metal lath, only twenty-four were retained: of the forty-four different heights, thirty-three lengths, and thirty-four widths of hospital beds being made, one standard size in length, height, and width was retained. In many cases, a reduction of ninety-seven per cent was made, with a vast saving to producers. This process is called simplification, and is being applied in many industries. Varieties which are kept are standards until others are devised; manufacturer, merchant, and consumer must be satisfied, and the process frequently necessitates scientific research.

Standardization in Other Countries. Besides its coöperation with Federal standard boards and other bodies, the American Engineering Standards Committee coöperates with such committees in other governments. A recent international conference of twenty nations on standardization made plans for an international standards committee to effect industrial measures which will apply to all countries. A Pan-American conference on the subject, started by the Latin-American countries, was held in Lima, Peru, in 1924.

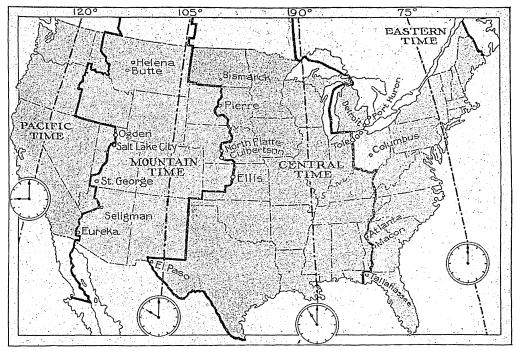
Is Standardization Wholly Desirable? As the foregoing discussion has indicated, standardization simplifies processes, stabilizes production, and saves time and money for the producer. The consumer is assured that his goods will meet certain tests of quality and form, and frequently he can buy them at lower prices than formerly prevailed. The effects of standardization and mass production are not all good, however, even for the producer, for it inevitably slows up some avenues to progress by making industry rigid and inflexible. This is because huge investments in equipment for quantity production cannot be sacrificed or scrapped as soon as new discoveries are made, no matter how reasonable or practical the new discovery may be; economic necessity alone can force the change.

Those who are averse to standardization usually admit its results, but deplore the standardizing tendency in its effect on human beings. They maintain that it replaces beauty and originality of mind. The disadvantages of standardization are equally the characteristic aspects of the machine age in which we live.

STANDARD OF LIVING. See Sociology (Applied Sociology).

STANDARD OIL COMPANY. In 1862 only three years after the world's first oil well was sunk at Titusville, Pa., John D. Rockefeller and a few associates began the development of petroleum refining at Cleveland, O., but they were not incorporated under the name of the Standard Oil Company (of Ohio) until 1870. By 1882 the company had acquired such a commanding position in the growing industry that it was classed as one of the principal business enterprises of the country. In that year all of the stock of this company and stocks of various other companies were transferred to trustees of the Standard Oil Trust. In August of 1882, the trustees organized the Standard Oil Company of New Jersey, now called the Standard Oil Company, parent of an operating subsidiary bearing the former name. By 1911 it had grown to such size and represented so large a proportion of the industry that it was designated a "trust." Under authority of the Sherman Law, and through a decision of the Supreme Court, the Federal government in 1911 dissolved the company. It was then divided into thirty-four parts, and the parent company proceeded to distribute to the stockholders the stocks of thirty-three subsidiary companies.

Before 1911, the public had known only one Standard Oil Company, but after the dissolution there were thirty-four corporations; some were known by such names as Standard Oil Company of New York, and Standard Oil Company of Indiana; others had entirely different names, as Atlantic Refining Company, and Ohio Oil Company. The parent company is



THE ZONES OF STANDARD TIME AS OF SEPTEMBER 27, 1936

still the largest unit. The Standard Oil companies of Indiana, New York (now Socony-Vacuum), and California are next in size, each with assets of about a billion dollars.

These companies now have no official connections. They are active competitors, and are prevented by law from forming agreements in respect to prices, market limits, and so forth; but there is still a certain similarity of management among some of them, probably owing to an identity of ownership. They are still spoken of as the Standard Oil group, although many of them have long since been without the management which produced the Standard Oil success. See Rockefeller; Petroleum.

STANDARDS, BUREAU OF. See COMMERCE, DEPARTMENT OF.

STANDARD TIME, the system by which time is now measured in the daily affairs of life in America. When the sun is on the meridian of any particular place, the time at that place is noon. This is true solar time, or sun time. As the earth turns on its axis from west to east, the sun appears to travel from east to west, and the spot at which the sun is on the meridian is likewise moving from east to west. The sun is therefore on the meridian at Saint Louis about an hour later than at New York; thus, when it is noon by sun time in New York, it is only 11:00 o'clock in Saint At all places east of New York, it is afternoon, because the sun has already passed them. It is clear that every fraction

of a degree of longitude has a different true noon.

A system of standard time was advocated to remedy the confusion which arose from the difference in local sun time. The suggestion was first made by Sir Sandford Fleming (which see). The old system of using sun, or local, time was especially annoying to travelers, for each railroad and city had its own time. The result was that several railroads meeting in a town might all use different time systems; traveler arriving at a terminus at 10:30 o'clock might wish to take another train at 11:00, and, because of differing time standards, might have to wait an hour or more for his outgoing train, or he might find his train already gone.

The need of a standard for all parts of the world led to the Prime Meridian Conference at Washington, D. C., proposed in 1882, but not held until 1884. In 1883 the railroads of the United States and Canada adopted the system of standard time. The railroads having agreed to a uniform system, it was not long before the use of standard time was general in all lines of enterprise. In some rural communities, the change was slow, but once it was adopted, it was retained because of its simplicity and convenience.

Under the system of standard time, the continent is divided into parallel zones, each of which takes the sun time of practically its central meridian. These central meridians dif-

fer from Greenwich longitude by exact multiples of 15°, this being the distance traveled by the sun in one hour. Thus, the standard-time meridians in North America are 60°, 75°, 90°, 105°, and 120° W. Each zone extends 7° 30′ east, and the same distance west, of the standard meridian. For practical purposes, the limits of the time zones are not rigid; for example, if a town lies on both sides of a meridian, the same time is kept in all parts of the town;

and, particularly in the western part of the United States, the boundaries of zones are uneven, that terminal points of great railroad systems may have the same time as their eastwardstretching divisions

The time of the 60th meridian is called Atlantic, or Colonial, time; that of the 75th is Eastern; of the 90th, Central; of the 105th, Mountain; and of the 120th, Pacific. These are respectively four, five,

six, seven, and eight hours earlier than Greenwich time. An act of Congress in 1918 made standard time legal throughout the United States, added another meridian, 150° west from Greenwich, as the standard for Alaska, and placed any readjustments in the time zones under the jurisdiction of the Interstate Commerce Commission. See Daylight Saving.

STÄNDERAT, shten' de raht, a legislative body of Switzerland (which see).

STANDISH, MILES, or MYLES (1584-1656), an American colonist, born in Lancashire, England. What little education he possessed was received in that county, but most of his youth was spent in the British army. Before 1603 he had been appointed lieutenant, for bravery in the wars in Holland, and in 1600 he joined the Separatist colony in that country. He was not, however, a member of the church of the Separatists, but was simply their assistant in colonization plans and in training their militia. He was one of the passengers on the Mayflower, and immediately after its landing at Plymouth, Mass., was chosen military captain of the colony.

His soldiers were few, but he made such a brave showing with them on several occasions that the Indians greatly feared him. In 1622,

when the savages planned the destruction of both Weymouth and Plymouth, Standish with only eight men attacked their camp, killed their two chiefs, and put the assembled tribes to flight. He had unusual business ability and, as assistant to the governor and treasurer of the colony, secured reductions in British claims that saved the colonists thousands of dollars. The Courtship of Miles Standish, by Longfellow, who was a descendant of John Alden and Pris-

cilla Mullins, was not intended to be accurate in every detail, but the main points of the courtship as given in the poem are correct.

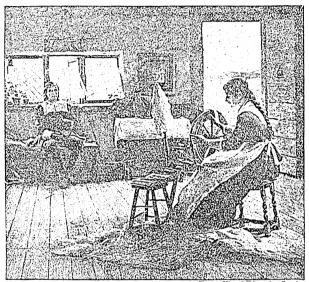
Related Subjects. The article PLYMOUTH COLONY (The Honored ro2) includes a list of names of the May-flower's passengers, in the exact language and spelling of Governor Bradford. See, also:

Alden, John Bradford, William Courtship of Miles Standish Massachusetts Bay Colony Pilgrims Plymouth Rock

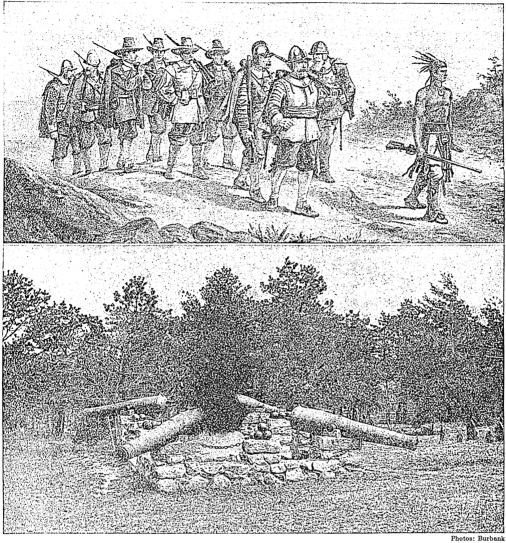
STANDPIPE.
See RESERVOIR.

STAND UP, STAND UP, STAND UP, STAND UP, FOR JESUS (hymn). See Hymns AND Hymn Tunes.

STANFORD, LELAND (1824-1893), an American capitalist and philanthropist, who assisted greatly in building the great West, was born at Watervliet, N. Y. After a brief school course and some study of law in his home town, he went to Port Washington, Wis., in 1849, and there practiced law for three years. He was not very successful, so he moved to California to try gold-mining. In this he made considerable money, but the real basis of his fortune of \$50,000,000 was a mercantile business which he established at San Francisco, in 1856. In 1860 he entered politics as a delegate to the convention that nominated Lincoln, and in 1861 was elected governor of California. In the latter year, he was chosen president of the Central Pacific Railway, then under construction, and did such successful lobbying at Washington that Congress granted large government aid for the road. Stanford was then requested by the directors to take personal charge of the building of that part of the line crossing the Sierra Nevada Mountains, and he established the remarkable record of laying 530 miles of mountain road in 293 days. He also financed experiments in moving pictures (see page 4707).



PRISCILLA RECEIVES A CALLER



STANDISH, THE CAPTAIN OF PLYMOUTH

It was his boast, according to Longfellow's Courtship of Miles Standish, that, like Caesar, "he knew the name of each of his soldiers." He is shown above with his troops on the way to a meeting with the Indians. Below, the grave of Standish, at Duxbury, Mass. (See preceding page.)

Founded a Great University. From 1885 until his death, Stanford was United States Senator from California, but after 1885 the chief interest of his life was in Leland Stanford Junior University (now known as Stanford University), at Palo Alto, Calif. This was a memorial to his son, who died in Rome, Italy, at the age of sixteen. See STANFORD UNI-R.L.W.

STANFORD UNIVERSITY, a coeducational institution, is situated thirty miles southeast of San Francisco, in the Santa Clara Valley, which, in fertility and natural beauty, is one of the most attractive sections of the state of California. The university was founded by

Leland Stanford and Jane Lathrop Stanford, his wife, in memory of their only son, Leland Stanford, Jr., who died in 1884, at the age of sixteen. The cornerstone of the first building was laid on May 14, 1887, and the university was opened on October 1, 1891.

The buildings of the university are an adaptation of the old Spanish Mission architecture. The central group of buildings constitutes two quadrangles, one surrounding the other, and both connected by arcades. The inner quad-rangle of twelve one-story buildings opens through a continuous arcade upon a paved court, three and one-quarter acres in extent, diversified by circles of subtropical plants.



The buildings of the outer quadrangle are two stories in height, and are surrounded by an arcade opening outward. The Library, Education Building, and Art Gallery form the third There are also residence units and quadrangle. gymnasiums for the men students and for the women. The soft buff sandstone and grayishred tile roofs harmonize in the California sunshine with the golden-brown slopes of the Mount Hamilton range of mountains in the foreground, and with the deep blue of the Santa Cruz range in the background.

The scope of the university is indicated by the following schools: biological sciences, education, engineering, fine arts, hygiene and physical education, letters, physical sciences and social sciences, the graduate schools of business and of law on the campus, and the school of medicine in San Francisco. The Hopkins Marine Station at Pacific Grove on Monterey Bay is a branch of the school of biological sciences.

Stanford was founded to "help equip students for personal success and direct usefulness in life." In the schools which have been established, the university undertakes to give a thorough specialized training, and a steadily increasing number of advanced and professional degrees are granted each year. It has been announced, as a university policy, to eliminate gradually the general elementary work offered in the first two years, leaving such courses to the junior colleges, in order that the university may strengthen and develop advanced undergraduate and graduate study and research. Stanford is thus realizing the desire of the founders, who wanted to "begin where others left off."

The first president of the university was David Starr Jordan (which see), who largely determined the policies of the institution. Its most noted graduate is Herbert Hoover, thirtyfirst President of the United States.

STANHOPE, CHARLES, EARL OF.

PRINTING PRESS.

STANLEY, FREDERICK ARTHUR, EARL OF See DERBY, FREDERICK ARTHUR Derby. STANLEY.

STANLEY, SIR HENRY MORTON (1841-1904), famous for his discoveries in Africa, was born at Denbigh, Wales, and baptized under the name of John Rowlands. His father died when Stanley was two years old, and he spent most of his youth in a workhouse, sailing as cabin boy on a vessel to New Orleans, when about eighteen. There a merchant, Henry Morton Stanley, adopted him, but died shortly afterward without making provision for him.

At the outbreak of the War of Secession, young Stanley joined the Confederate army. After his release from prison, he joined the United States navy, becoming ensign on the *Ticonderoga*. Gradually, he took up newspaper work, and his pluck and determination made

him particularly valuable as a correspondent in difficult and dangerous situations. After representing the New York Herald in Abyssinia and in Spain, he was commissioned by that paper to "go and find Livingstone." He

spent a year in Egypt, Constantinople, the Crimea, Palestine, and Persia, on various missions for the Herald, and then embarked for Africa, reaching Zanzibar January 6, See LIVING-1871. STONE, DAVID.

His African Service. Starting from Zanzibar in March, 1871, Stanley pushed on to Ujiji, on Lake Tanganyika, where, in speech when he saw the veteran explorer was characteristic:



HENRY M. STANLEY

November, he found He opened the "Dark Con-Livingstone. His first tinent" to the knowledge of man and to the territorial schemes of the nations of Europe.

"Dr. Livingstone, I presume?" At Ujiji he remained until January, and, as the older explorer refused to accompany him back to civilization, he left supplies and returned to Europe in 1872.

Two years later, after Livingstone's death, Stanley returned to Africa. He set out from Zanzibar in November, 1874, with three white men and over three hundred natives, and pushed into the interior, sailing about Victoria Nyanza and other lakes, before beginning the most perilous and important part of his enterprise: a journey down the Congo, from its source to its mouth. All of his white companions and half of his native carriers had died before he emerged on the Atlantic coast, in August, 1877, but the course of the great waterway into the heart of Africa had been made clear.

A direct result of this exploration of the Congo was the founding of the Congo Free State, in the interests of which Stanley spent in Africa the years from 1879 to 1884, establishing stations, making treaties with the natives, and collecting much additional geographic information. In 1886 he visited the Egyptian Sudan, his object being the relief of Emin Pasha, and on this expedition he again crossed the continent from coast to coast, passing, as he said, through "miles and miles, end-less miles, of forest." This was his last trip to Africa, but he had proved himself one of the greatest and most successful of explorers, and had contributed more to the knowledge of the "Dark Continent" than any other man, with the exception of Livingstone.

Career in England. During these years of active work, Stanley had been a United States citizen, but in 1892 he was renaturalized as a citizen of Great Britain. At the wish of his wife, Dorothy Tennant, whom he had married in 1890, he stood for Parliament, to which he was elected in 1895, as member from North Lambeth. In 1899 he was knighted for his services in Africa.

His Character. The many honors conferred upon Stanley were a just tribute to him. His great success was due primarily to his inflexible will, which took no account of apparently insuperable difficulties, and to his natural ability to deal with savage peoples. He was always truthful and kind in his dealings with the natives, but did not hesitate to force them to do his will, if gentler measures failed and their aid was absolutely essential.

Stanley's Literary Work. His books attained a wide popularity. These, which include How I Found Livingstone; My Kalulu; Through the Dark Continent; In Darkest Africa; and My Dark Companions, have a charm and a dramatic force which are rare in books of travel.

STANLEY POOL. See Congo River; also, Belgian Congo (Communications).

STANOVOI, stah no voi', MOUNTAINS, a range of mountains in Siberia, about 2,500 miles long, running from the Mongolian frontier in a northeasterly direction, and terminating at East Cape, on Bering Strait. An offshoot extends in a southerly direction through the peninsula of Kamchatka. In reality, the system is a continuation of the Yablonoi range, and is more in the nature of a rugged, elevated plateau than a chain of mountains. greatest height is attained in Mount Tehokhondo, a little over 8,000 feet above sea level. The drainage from its slopes feeds numerous rivers, the most important of which are the Lena, Amur, and Yenisei. In the extreme northeast, it forms the dividing line between the Pacific and Arctic oceans. As far north as the parallel of 60°, the lower slopes are densely forested, but farther north they become bare and desolate. The whole range is rich in minerals and metals which are now being intensively mined by the Soviets. Modern machinery and industrial workers are constantly being brought in from various other regions of the republic.

STANTON, EDWIN McMasters (1814-1869), an American statesman, the great Secretary of War in President Lincoln's Cabinet. He was born in Steubenville, O. After two years of study at Kenyon College, he studied law, and was admitted to the bar in 1836. In 1856 he moved to Washington, D. C., where he specialized in practice before the United States Supreme Court. He succeeded Jeremiah Black as Attorney-General in 1860. Always outspoken, Stanton made no concealment of his

violent opposition to slavery, and Lincoln confidently made him Secretary of War, although he and Stanton were hardly friends. Stanton showed a genius for administration and for sure, rapid judgments, which made his conduct of his office extremely efficient. To him, almost as much as to Lincoln, and surely as

much as to any general in the war, the successful outcome of the struggle may be attributed.

Stanton's blunt statements, his tactlessness, and his pitiless judgments made many enemies. Lincoln overlooked his faults, but after Johnson became President, the two clashed incessantly over reconstruction issues. It was because Johnson tried to remove his Secretary from office that the former



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EDWIN M. STANTON

was impeached. After the President's acquittal, Stanton resigned. President Grant appointed him Associate Justice of the Supreme Court, but a few days after the appointment, Stanton died, worn out from overwork, an old man at fifty-five.

Related Subjects. The reader is referred to the article JOHNSON, ANDREW, for details of the struggle between him and Stanton. See, also, TENURE OF OFFICE ACT.

STANTON, ELIZABETH CADY (1815-1902), an American reformer, a pioneer in the cause of

woman suffrage, was born at Johnstown, N. Y. She was graduated from Emma Willard Seminary, in Troy, N. Y., and in 1840 was married to Henry B. Stanton, a man prominent in the anti-slavery agitation. While visiting in London, she met Lucretia Mott, and it was largely through her influence that Mrs. Stanton decided to call a woman's rights convention at



Photo: Brown B

ELIZABETH CADY STANTON

her home in Seneca Falls, in 1848. This began her active public career, during the course of which she constantly championed equal rights for the two sexes; that is, more specifically, she worked for more intelligent divorce laws, for equal rights of property, and for suffrage and equal educational advantages. She was the first president of the National Woman's Suffrage Association, serving from 1865 to 1893.

Mrs. Stanton's lecture tours included the United States, Canada, England, France, and Scotland. In 1888 she presided over the first International Council of Women, in Washington. She was one of the founders, and for a time the editor, of *The Revolution*, a reform periodical. A prominent feature of her life was the attention she gave to the duties of her own home, and her skill in avoiding any conflict of public work with domestic life. Some of the reforms she agitated are still unachieved, but during her lifetime she witnessed great improvement in the status of women.

In Literature. Her writings embrace her autobiography, entitled Eighty Years and More, and A History of Woman Suffrage, of which she was joint author with Susan B. Anthony and Mathilda Joslyn Gage.

Related Subjects. In the group of social and political reformers of the period of Mrs. Stanton's activity were such devoted women as SUSAN B. ANTHONY, MARY A. LIVERMORE, BELVA LOCKWOOD, LUCRETIA MOTT, DR. ANNA SHAW, and FRANCES WILLARD. Their biographies will be found in these vol-

will be found in these volumes. See, also, Woman Suffrage; Women, Great American.

STANTON, FRANK LEBBY (1857-1927), a journalist and poet whose negro songs and verse of the Southern United States were very popular. From his early youth, Stanton was in the field of journalism. He was born in Charleston, S. C. After receiv-



FRANK L. STANTON

ing a common-school education, he served an apprenticeship as a printer, and at one time was employed as an office boy by Joel Chand-

ler Harris, one of the South's most delightful writers.

Stanton early became associated with the press of Atlanta, Ga.; his column in the Atlanta Constitution he called "News from Billville." The charm, simplicity, and optimism of his work were unique. If measured by the opinion of newspapers and critics, the writings of few recent American poets have been more popular, both in the United States and Canada. He was made poet laureate of Georgia in 1925. He used a charming negro dialect in many of his poems and songs, and his pictures are true to the old-time negro life. Several of his poems will live long in the hearts of all music-lovers, such as Mighty Lak' a Rose, Li'l Feller, and Just A-Wearyin' for You. Some of his poems were set to music by Carrie Jacobs Bond.

Collected Writings. Among the volumes of Stanton's verse are Songs of the Soil, Songs from Dixie, Up from Georgia, and Little Folks Down South.

One Country, an outburst of patriotism, begins as follows:

After all,

One country, brethren! We must rise or fall With the Supreme Republic. We must be The makers of her immortality—

Her freedom, fame,

Her glory or her shame: Liegemen to God and fathers of the free!

After all-

Hark! from the heights the clear, strong clarion call And the command imperious: "Stand forth, Sons of the South and brothers of the North!

Stand forth and be
As one on soil and sea—

As one on soil and sea— Your country's honor more than empire's worth."

STAPES, sta' peez, one of three tiny bones in the cavity of the middle ear. See EAR.

STAPHYLOCOCCUS, staf e lo kok' us, a genus of spherical bacteria, occurring in bunches, also singly or in pairs. See BACTERIA AND BACTERIOLOGY; BOIL.



TAR. "The night has a thousand eyes, the day but one." So runs the familiar poem, referring to the stars that shed their radiance at night, and the sun that gives us the light of day. The sun is so near us, as nearness is reckoned in the infinitude of space, that it seems to be the biggest and brightest object in the heavens. If we could view it from a

distant vantage point in space, we should see it as a tiny speck in the universe. It is a true star, consisting of hot gaseous matter and shining by its own light, but there are millions of stars of greater size and brilliance; it is their remote distance that makes them seem mere points of light in the vault of heaven. Stars are composed of elements found also in the composition of the earth, and in its early history our planet may have been a small luminous star, torn out of the body of the parent sun. Most astronomers believe that stars take their origin in the condensing of nebulous matter (see Nebula).

Stars in Space. Our sun and its attendant planets are situated in a local star cluster somewhat north of the median plane of the greater system we call our stellar universe. The shape of this vast aggregation of stars is believed to be approximately that of a watch or grindstone. As the human mind pictures it, the stars are arranged between the two flat surfaces. Astronomers have tried to calculate the dimensions of this huge system, and estimates run from 30,000 light years to 300,000 light years for the length of the equatorial diameter, but the latter figure is nearer the ones generally accepted. (A light year is the distance light travels in one year, at the approximate rate of 186,300 miles per second.) The distance through the shorter diameter (from the back of the "watch" to the face) is thought to be one-twentieth to one-tenth that of the longer diameter.

Visible across the sky on a clear night is the beautiful band of silvery light called the Milky Way. The Milky Way is regarded by practically all astronomers as the fundamental, central plane of our stellar universe. What we actually see is the projection on the sky of the stars in the direction of this plane. So numerous are they in this central region, and so great is the distance from center to periphery, that the eye sees only a hazy wreath of light. The telescope, however, resolves the Milky Way into millions of radiant stars, the most sublime of all spectacles projected on the celestial sphere. When we look toward the Milky Way, we are viewing the stars in the direction of the far-extended equatorial diameter of our disc-shaped system. The less crowded portions of the sky represent those regions in the direction of the shorter diameter, at right angles to the plane. The Milky Way is also known as the Galaxy, but this name is applied by some astronomers to the stellar system as a whole.

[The reader is referred to full-page illustration of the Milky Way, on page 471.]

Varying estimates have been made of the number of stars in our system. In the northern hemisphere, on a clear night, the largest number visible to the naked eye at one time is from 2,000 to 3,000. But the largest telescope in the world, the 100-inch reflector of the Carnegie Observatory on Mount Wilson (near Pasadena, Calif.), can photograph about one billion stars. It is known that there are a great many dark stars, and stars so far away that neither the telescope nor the camera can

reach them. The total number of stars has been estimated at from thirty to forty billion.

The imagination recoils from attempts to visualize the spaces that separate these heavenly bodies. Light, the fastest traveler in space, must journey over four years from the star group nearest us—the double star Alpha Centauri and a dwarf companion—before that light is visible to us. On the remote edges of our system are stars that lie thousands upon thousands of light years away. This fascinating subject is further treated in the article ASTRONOMY (Distances That Defy the Imagination).

External Stellar Systems. Thus far, we have been considering the stellar system of which our solar system is such a minute portion. Incredible as it may seem, it is believed by most astronomers that far out in the realms of space lie other stellar systems, some of them perhaps larger than our own. One of these in particular has been eagerly studied. When projected on the sky, it appears to have a diameter about six times that of the moon, and so can be seen without a telescope. This is the great spiral Nebula of Andromeda, which the eye sees as a misty cloud of light. It is known to be about 1,000,000 light years away. Its spiral shape is readily seen in photographs, and it has been suggested that, if there are worlds such as ours in this far-off universe, intelligent beings may be taking similar photographs of our own system. Our Milky Way is probably a spiral rather than the wreath it seems to be. Not visible to the naked eye, but revealed by the telescope, are hundreds of thousands of these "island universes," some appearing as ovals, some edge-on, some as spheroids. The fainter ones are supposed to be 140,000,000 light years away. There is another type of external stellar group that is also being studied. This is the star cloud, represented by the Magellanic Clouds of the southern sky. These star clouds also are outside our system.

Star Movements. We are accustomed to speak of the "fixed" stars and the "wandering" planets, but it is the immense spaces that lie between us and the stars that make them seem motionless to the casual observer. All of them, including our sun, are in reality journeying onward through space. Our sun is traveling in the general direction of the star Vega, or, more accurately, toward a point in the con-stellation of Hercules, at the rate of about twelve miles per second; and many other stars are speeding on at higher velocities. From the observed phenomena, astronomers are agreed that these movements are not entirely at random, but, like the motions of bees in a swarm, combine the random motion of individuals with forward motions of groups. The stars within range of measurements are known to be grouped into two main streams,

STAR

moving in opposite directions. It has been suggested that these star streams represent the two arms of a vast spiral, curving from opposite sides of a nucleus. It is believed that these facts point to a stellar system not yet in what physicists call dynamic stability. For untold millions of years to come, it is conjectured, the stars will continue to travel about in their courses, until the system reaches a stage of equilibrium, with the stars symmetrically distributed.

To the non-professional observer, of course, these movements are not apparent. So vast are the distances in space that the forms of the constellations and the general picture of the sky seem to remain unchanged through a lifetime, and even for centuries. Astronomers, however, have ways of detecting the proper motion of the stars, by which we mean their displacements in various directions on the dome of the sky. For instance, changes in relative positions can be noted by comparisons of positions measured at long intervals, either visually or photographically. All of these changes are real, but are not sufficiently large to have materially changed the sky pattern within the period of astronomical observation. Uncounted ages from now, however, the Dipper and many other conformations familiar to us will have disappeared. The displacements that astronomers detect are relative, of course, because these scientists must make their observations from an earth that is itself being carried through space with the rest of

the solar system. Besides these movements, the stars have certain apparent changes of position that anyone can observe for himself. Like the sun, the stars rise and set, for the earth's rotation on its axis, once in twenty-four hours, gives the dome of the heavens an apparent move-ment westward of about 15° an hour. A star observed near the eastern horizon early in the evening will have traveled apparently far toward the west, several hours later. Since the whole sky seems to be turning, the observed star's position relative to some other star or constellation will remain unchanged. Then there is the apparent motion of the stars caused by the revolution of the earth in its orbit. Because of this movement, the heavens seem to change from month to month, but the stars are always back at the end of the year in the positions observed twelve months before (see, in the Astronomy article, full-page charts of the heavens in the four seasons).

Besides moving onward in space, some stars are revolving in pairs around a common center of gravity, forming binary systems (see DOUBLE STARS). Thousands of such systems have been discovered, as well as numerous triple and multiple systems, in which a binary group revolves about a third star, or each component

of the binary has its own companion star. These stars are held together by gravitational force.

Grouping and Naming of Stars. The constellations mentioned in the preceding section are natural groupings of stars that bear names given them by the ancients. The names are mostly drawn from mythology, and were applied because of some real or fancied resemblance to men, animals, or objects, or were chosen arbitrarily. This division of the sky into star groups was a considerable aid in the identification of stellar positions at a time when astronomy was young, and is still a serviceable guide to star locations. In many cases, a star's name is that of the constellation in which it appears, plus a Greek letter; thus, Alpha Centauri is the brightest star in Centaurus. Other stars are known by a combination of constellation and number. But the great majority of stars that have any designation at all are known only as a number in some catalog. The catalogs sometimes contain hundreds of thousands of stars. The subject of grouping and naming is further treated in the article Astronomy (The Stars and Their Names).

Magnitude. In respect to the degrees of brightness with which they shine, stars are divided into magnitudes. Each magnitude is about two and one-half times brighter than the magnitude next below it. The human eye cannot discern stars fainter than the sixth magnitude, but those of the twentieth magnitude, and even fainter ones, are revealed through the largest telescopes. Stars of the first magnitude shine one hundred times as brightly as those of the sixth, and their light is a million times as intense as those of the sixteenth. While all the bright stars are popularly called of the first magnitude, the astronomer has adopted a scale such that a star like Altair or Aldebaran is of standard first magnitude, and the magnitudes of stars brighter than these are expressed by decimals and negative numbers. Thus Sirius is of magnitude -1.6; and Capella +0.1.

From the days of the Greek astronomer Hipparchus, in the second century B.C., catalogs of stars have been compiled from time to time. The table on the following page gives the results of recent investigations on the numbers of the stars of different magnitudes; but as estimates are being constantly revised, it must be considered subject to change.

Among the stars of first magnitude, or brighter, are Sirius, Canopus, Alpha Centauri, Vega, Capella, Arcturus, Rigel, Procyon, Alpha Eridani, Beta Centauri, and Altair. Of these, some are very much brighter than the first magnitude. For example, Sirius is 2.5 magnitudes brighter than a standard first-magnitude star, such as Altair.

Total	numbe	r of	stars	to	magnitud	de	. 2
"	"	"	"	"	"	I.O	11
"	"	"	"	"	"		
46	"	"		"	"	2.0	39
							140
"	"	"	"	"	"	4.0	500
"	"	"	"	"	"	5.0	1,600
"	"	"	"	"	"	6.0	4,800
**	"	"	"	"	"	7.0	14,000
"		"	"	"	"	8.0	40,000
"	"	"	"	"	"		120,000
"	"	"	"	"	"	•	•
"	"	"	"		"		320,000
						II.O	870,000
"	"	"	"	"	"		2,300,000
"	"	"	"	"	"		5,700,000
"	"	"	"	"	"		14,000,000
"	"	"	"	"	"		32,000,000
"	"	"	"	".	. "		70,000,000
"	"	"	"	"	"		150,000,000
"	"	"	"	"	"		300,000,000
"	"	"	"	"	"		550,000,000
"	"	"	"	"	"		
							,000,000,000

Distances and Diameters. The measurements of star distances and diameters are among the most significant achievements of modern astronomy. The first important step in measuring distances was accomplished by Friedrich Bessel in 1838, when he computed the annual parallax of the star 61 Cygni. By this method, the position of a star is observed with reference to near-by stars, and six months later its position is observed again, the earth in that time having traveled over half of its orbit round the sun. The angle subtended by these two sight lines is twice the parallax of the star, and is the basis for figuring its distance (see Parallax; Astronomy). method is limited to the nearer stars, for the subtended angles for most of the stars are too minute to be measured, even with the most delicate instruments. The following paragraph makes this clear.

How Star Distances May Be Determined. If, as indicated in the diagram, the position of a star (S) be measured when the earth is at



HOW STAR DISTANCES ARE DETERMINED

the position E, of its orbit, the measurement will be affected by the parallax, E S H, of the star; and if, six months later, when the earth has reached the position E' of its orbit, the position be measured again, the difference between the two measures will be twice the parallax. From the parallax, the distance is obtained by a simple formula. Since the distance H S is very great compared with the known base line H E, about 275,000 times as large for the nearest fixed star, the angle E S H is very small, and therefore very difficult to

measure accurately. The distance H E, from sun to earth, is 93,000,000 miles.

STAR

It is, of course, impossible to have the triangle ESH represented accurately as to scale. To represent the distance HS accurately in relation to the distance HE would require the line HS to be nearly two miles long, if HE is one-half inch.

The next step was determination of distances by use of the spectroscope (which see). By a method recently perfected, which is too complicated to explain here, the distance of a star of known apparent brightness can be calculated from estimates of the relative intensities of certain lines in its spectrum. Already the distances of more than 2,000 stars have been determined by the spectroscopic method. Another method, having the advantage of being applicable to the extremely remote stars, is explained in the section on Variable Stars, below.

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Equally astounding is the progress made in measuring star diameters. So remote are the stars that through the largest telescopes they appear as points of light, not as discs, and direct measurements of their diameters were impossible until the invention of the interferometer, by Professor Michelson of the University of Chicago. By the interferometer method, a plate containing two parallel slits is placed over the end of the telescope, resulting in the projection of a star image crossed by light and dark bars. The bars disappear as the slits are separated, and there is a direct relation between the diameter and distance of the star and the amount of separation needed to bring about this disappearance. The beam interferometer is a more powerful instrument which enables the observer to measure even smaller angles than the ordinary interferometer. The first star diameter determined by this method was that of Betelgeuse, measured at the Carnegie Observatory on Mount Wilson. The four largest stars, and their diameters in miles, are given in the following table:

Antares (Alpha Scorpii)......400,000,000 Alpha Herculis......350,000,000 Mira (Omicron Ceti)......250,000,000 Betelgeuse (Alpha Orionis).....235,000,000

The parallaxes of Mira and Alpha Herculis are uncertain, so their diameters are regarded as not so well determined as those of Antares and Betelgeuse. How lost in one of these huge bodies would our sun be, with its diameter of

864,000 miles!

Variable Stars. Stars which appear to change their brightness, either slowly, regularly, or continually, are called variable. They may blaze out suddenly and disappear, grow bright and dull alternately, or slowly fade. The periodical darkening of some stars is attributed to an eclipse by some intervening opaque body. Algol is the most famous star of this class (see Algol). Certain shortperiod variables, called Cepheids from the variable star Delta in the constellation Cepheus, have provided astronomers with a remarkably accurate gauge for measuring star There is a fixed relationship bedistances. tween the absolute magnitude and length of period for these stars. When the period has been determined, the absolute magnitude can be deduced. The apparent magnitude is easily known, and the distance of the star can be calculated from the simple relation between the absolute and apparent magnitudes. was from the observance of Cepheid variables in the Nebula of Andromeda that the remote distance of that star system was ascertained. The cause of the periods in Cepheid variables has puzzled astronomers, since the eclipse theory does not explain the observed phenomena in their case. An hypothesis regarded favorably by some scientists attributes their variation to periodic pulsations of the gaseous interior, causing changes in the rate at which the light is emitted.

Another interesting type of variable is the nova, or new star. A nova is a star that blazes out suddenly with great brilliance, after which it fades rapidly, then more slowly, to a fairly uniform dimness, or dies out altogether. Such stars are not to be regarded as newly created stars, but as faint stars that have suddenly increased greatly in brightness. The appearance of these novae has been attributed to collisions between two stars, and also to the passage of a dim or non-luminous star through a stream of meteorites which might release sources of atomic energy. Because of the immense distances separating stars, star collisions must occur too infrequently to account for the number of novae observed.

Small fluctuations in the heat radiation from the sun have been established, connected to some extent with the sun-spot periodicity. Similar changes in the light of the sun are indicated, and the ultra-violet light has been shown to have much greater changes. Thus the sun is the nearest variable star visible to The observation of variables is carried on largely by observatories, but their work is supplemented by that of amateur astronomers.

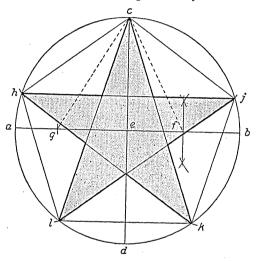
Types of Stars and Their Evolution. Stars are classified according to the kinds of light radiations they emit, as revealed by the spectroscope (which see). The hottest are white, and their spectra show the presence of hydrogen and helium. Yellowish stars, of which our sun is a type, are of average mass, density, and temperature. Red stars are of still lower temperature and are of two kinds: namely, huge tenuous masses, such as Betelgeuse and Antares, supposedly in an early stage of evolution, and small, denser stars nearing the time of extinction.

The spectral types of stars are now designated by the letters O, B, A, F, G, K, M, B, N, and S. O and B stars have spectra characteristic of helium and hydrogen, and thus are intensely hot white stars. Stars whose spectra range between A and F (the classes are not rigidly marked off from one another) are white or blue, and are dominantly of hydrogen composition. In the groups F to G and G to K are the yellow stars, and in these the metallic elements are found conspicuously. The red and coolest stars are in Class M, and the last stage is invisibility. According to an hypothesis strongly advocated in recent years, stars begin as Class M, and are then widely extended gaseous bodies of lowest possible density and of low temperature and luminosity. By a continuous process of contraction, they grow hotter and denser, but only those of largest mass generate enough heat to become O or B stars. After reaching a point of critical density, they reverse the evolutionary process and become M stars again, after which they attain solidity and extinction of brightness. Stars in the ascending line are known as giants, and those in stages of descent are called dwarfs. This hypothesis is very satisfactory in many respects, but fails to account for all the facts. A satisfactory theory will have to be more complicated.

Whatever the life history of a star, it is known that stars exist through billions of years. The extreme slowness of decline (loss of mass by contraction) is supposed to be due to the vast stores of energy existing in the interior This energy is probably released through the disintegration of the atoms under the influence of tremendous pressures and temperatures, and serves to replenish the energy of radiation.

Mariner's Stars. "Steering by the stars" has become a common expression, and sailors, by careful observation of the position of certain well-known stars, are able to verify the correctness of, or error in, the courses they are steering. In the northern hemisphere, the familiar Dipper acts as guide to mariners and to hunters in the forests of the North. Two of its stars point to the North Star; that point ascertained, the other points of the compass are easily located. In the southern hemisphere, the Southern Cross serves the same purpose. Many a sailor, storm-tossed, his vessel driven miles out of its course, has been cheered and saved by a rift in the clouds which permits him a view of the Dipper or of the Southern Cross.

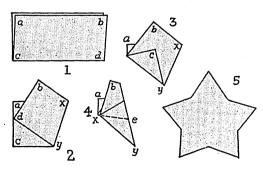
How to Make a Star. The accompanying diagram shows a geometrical drawing which may serve as a



HOW TO MAKE A STAR
The figure is explained in the text.

pattern for a five-pointed star. The drawing can be constructed as follows:

Draw a four-inch circle. Draw the horizontal and vertical diameters a b and c d. Mark the point of intersection e. Bisect e b and mark the point of intersection f. With f as a center and e f as a radius,



HOW A STAR MAY BE CUT FROM PAPER

describe an arc cutting a c, marking the point of intersection g. With g c as a radius and c as a center, describe two arcs cutting the circumference at h and g. With h and g as centers and the same radius,

describe arcs cutting the circumference at k and l. Form a star by connecting c and l, c and k, h and k, l and j, and h and j.

The five drawings of the second diagram show how a star may be cut out quickly by folding. Cut on the dotted line (x to e) in 4.

These directions will be especially helpful to a class desiring to make a flag [see Flag (How to Make a Flag)]. F.B.L.

Related Subjects. In addition to references included in this article, see list of related subjects at the close of the article ASTRONOMY.

STARBOARD. See SHIP.

STARCH, a soft, white, glistening powder, originating within the living cells of plants. It is especially abundant in wheat, rice, potatoes, and root foods such as arrowroot and sago. Starch is made up of hydrogen, carbon, and oxygen, and is therefore a carbohydrate. It is one of the most important foods known to man, and is an active producer of energy and heat in the body, through which it circulates in the form of grape sugar, a chemical change resulting from digestion. It is highly nutritious, but should be taken in combination with other foods (see Food).

The Plant as a Manufacturer of Starch. Starch-making is confined to those plants which contain a green coloring matter called *chloro-phyll*, and takes place only under the direct influence of sunlight, and when water and carbon dioxide are both present. Just how the chlorophyll bodies use the water and carbon dioxide to make starch is not known, for the process is understood by neither the chemist nor the botanist. Professor George L. Goodale of Harvard University has made the following interesting comparison between the starchmaking leaf and any mill—for ease of comparison, a flour mill:

THE THE PROPERTY OF THE PROPER

- '			
	TI	HE MILL	LEAF CELLS
Raw Material:	1	Wheat	Carbon dioxid
Energy:		, electrical, ter power	water Sunlight
Manufactured pro	duct:	Flour	Starch
By-product:		Bran, etc.	Orvgen

Characteristics. Under the microscope, many starches are seen to consist of minute, oval, or pear-shaped grains, each of which contains a central portion, or hilum, and a series of envelopes, arranged about the nucleus and having a common center. Starches from many plants, such as rice, corn, and potato, have each a very characteristic appearance under the microscope. This fact is often of service in the detection of adulteration in food products. For example, an expert microscopist can easily tell if arrowroot (an expensive starch) has been adulterated with potato starch (a cheap starch). Starch will not dissolve in water, alcohol, or ether, but in boiling water

the grains swell and break up, forming a stiff paste, when cooled.

An infallible test for starch is the addition of tincture of iodine to the starch paste, which produces a deep-blue color. This color disappears if heat is applied. The iodine test is useful in determining the presence of starch in foodstuffs. If starch is heated dry, it will change to a yellowish substance called dextrin. The starch in bread dough is by fermentation converted into dextrose, which is further changed into alcohol and carbon dioxide, the formation of which gas causes the bread to "rise."

How Starch Is Prepared for Use. Starches are divided into two general groups—those used for food and those used in laundering, in the finishing of certain textiles, and as a thickening material in calico printing. Some starches come under both groups. Starch is also used indirectly in the preparation of dextrin and starch sugar, potato starch being the principal

variety employed for this purpose.

Cornstarch, widely known and used, is the starch of Indian corn, or maize. The starch is first separated from the grain by steeping for a long time in water; it is then crushed between cylinders, and strained through a sieve. The milky fluid containing the starch grains is allowed to flow over a series of surfaces having a slight inclination, and in this process the heavier grains are deposited, while the lighter particles are carried into settling tanks. The deposit in the tanks is purified by a series of strainings and settling, the final product being dried by artificial heat until it forms the fine white flour sold as cornstarch.

Wheat, rice, and potatoes are extensively used in making starches for industrial purposes, rice starch being preferred for use in the laundry. Wheat starch is separated from the grain by two methods—fermentation and a mechanical process. In the former process, whole wheat or wheaten meal is soaked in water for the purpose of softening the wheat grains and causing them to swell. The grains are then reduced to a pulp, and a thick fluid is formed by mixing the pulp with water. The mixture is then placed in tanks and subjected to fermentation, after which the starch is separated in a washing drum, and purified by repeated washing and settling, being finally dried by gentle heat.

By the mechanical process, a stiff paste is made by kneading wheaten flour. This is washed over a fine sieve, in the course of which the starch is separated from the gluten, the latter remaining in the sieve as an elastic, sticky mass. The starch is then purified and dried. The gluten mass is utilized in various ways, notably as a food for patients suffering with diabetes, and as an ingredient of maca-

roni.

Potato starch is made by steeping and washing the potatoes, and then rasping them down to a fine pulp, which is deposited in water in the form of raw starch. The starch is washed over fine sieves so that the impurities and pure starch may be separated; only the latter passes through the meshes of the sieve. Potato starch is widely used as an adulterant and as a substitute for the pure food starches.

G.M.S.

Related Subjects. The reader is referred in these volumes to the following articles:

Arrowroot Chlorophyll Digestion Tapioca Carbohydrates Dextrin Sago Yeast

STAR CHAMBER, an old English tribunal which met at Westminster and which is said to have taken its name from a room where the meetings were held, which was decorated with gilt stars. It is supposed to have originated in the ancient exercise of judicial functions by the king's council. Until the fifteenth century, little is known of it, but in 1487 Henry VII reorganized it and gave it new powers, or, according to another theory, inaugurated a totally new court. His statute gave to a commission, composed of a chancellor, treasurer, keeper of the privy seal, chief justices, or, in their absence, two other justices, a bishop, and a temporal lord, the right to act as a court of trial for all misdemeanors of sheriffs or of jurors, and for all riots or unlawful assemblies. The trials were without jury, and any sentences short of death might be passed.

During the time of the Tudors, this court, arbitrary as it was, was of real service in reducing to order the great nobles, who, when brought before any ordinary court, often succeeded in intimidating the jury. Many abuses crept into its proceedings in the course of time, however, chief among them being the custom of forcing prisoners by torture to confess. Under James I and Charles I, the hatred felt against the Star Chamber greatly increased, and in 1641 the Long Parliament abolished it.

Modern Application. The term star chamber is used to-day to designate secret meetings of officials or politicians in which plans are laid for their present aggrandizement, rather than for the public good; or, by extension, to designate any secret session of unusual character.

STARFISH, one of a class of sea animals having the general appearance of a star or of a pentagon. The typical starfish has five arms radiating from a flattened, central disc, but in some species there are many more projections, the number ranging from five to forty. Usually, the arms are not so sharply marked off from the disc as in the related class, the brittle stars. Starfishes are not fish in the scientific sense of the term. They constitute the class Asteroidea in the major division, or phylum, Echinodermata (see ECHINODERMS), which includes brittle stars, sea urchins, sea

lilies, and sea cucumbers. These are the spiny-skinned creatures of the animal world.

The skin of the starfish is beset with limy spines arising from skeletal plates developed just under the skin. On the under surface of the disc is a mouth, and on the same surface of each arm there is a groove beginning at the mouth and ending near the tip of the arm. From rows of tiny holes in these grooves the starfish can push out slender, glassy tubes, or "feet." These

tubes exert a suction on surfaces and enable the animal to crawl. At the tip of each arm there is one small pigment spot, often called an eye, protected by a circle of spines. Starfish have remarkable

powers of renewal. If a starfish loses an arm, it grows another one. If the animal is cut in two, each of the pieces develops into a new individual.

Asteroids are found in all parts of the world except the Polar regions. There are no edible species, though the related sea cucumbers are prized as food in the Orient. Starfish have a well-developed digestive system, and subsist chiefly on oysters, mussels, clams, and snails. Nearly all of the central disc is occupied by a bag-

like stomach, into which the mouth opens. Folds of the stomach extend out into the arms. To reach the soft body of an oyster, the starfish forces open the valves of the victim's shell by pulling upon them with its tube feet. The oyster can withstand the strain for a time, but finally its muscles must relax. When the shell drops open, the starfish ejects its stomach through its mouth opening, turning the organ inside out and applying it to the soft body of its victim. Digestion and absorption then take place. In the North Atlantic, the common starfish causes serious losses by preying on the oyster beds.

STAR GRASS. See illustration, page 241. STARK, John (1728-1822), an American military leader, conspicuous in the Revolutionary War. Stark was a true patriot, for in 1776 he pledged his fortune to the soldiers, to induce them to reënlist. He was born in Londonderry, N. H., and while a boy was captured by the Indians, who styled him "the young chief." He fought in the French and Indian War, and at the beginning of the Revolution was appointed colonel. He was with Washington at

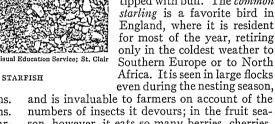
Trenton and Princeton, then retired temporarily from service. Called again to take command of the New Hampshire troops, at Bennington, in August, 1777, Stark attacked the enemy with the order—"There they are, boys. We beat them to-day or Mollie Stark's a widow!" In this battle, the enemy was defeated, and the victory paved the way for the surrender of Burgoyne at Saratoga. Stark was rewarded by thanks from Congress and

the rank of brigadier general, conferred in October, 1777. In the following year, and again in 1781, he commanded the Northern Department; he was brevetted major general in 1783.

THE STATE OF THE S

In 1894 New Hampshire presented his statue to the government for erection in Statuary Hall (which see).

STARLING, a song bird common throughout the Old World. It is black in color, glossed with greenish purple, or lilac, and has its feathers tipped with buff. The common starling is a favorite bird in England, where it is resident for most of the year, retiring only in the coldest weather to Southern Europe or to North Africa. It is seen in large flocks even during the nesting season,



numbers of insects it devours; in the fruit season, however, it eats so many berries, cherries, and even apples and pears, that it is considered somewhat of a pest at that time. It nests

about buildings, in hollow trees and bird houses. or in holes in cliffs. The eggs are four to seven in number, and a light greenishblue in color. About sixty common starlings were liberated in Central Park, New York, in 1890, and they have spread



THE STARLING

through many states in the eastern part of the country. The introduction of the starling is thought by some to have been a mistake, as it is a quarrelsome bird.

Scientific Name. Starlings constitute the family Sturnidae. The common English starling is Sturnus vulgaris.

STAR OF BETHLEHEM, a small, hardy plant of the lily family, the flowers of which have the form of a six-pointed star. The petallike sepals are white, but have green stripes on the outside, a color scheme repeated in the leaves, which are green with white stripes. The star of Bethlehem is a native of Italy, but has become a common garden plant in America. The flower stalk springs from a coated bulb (which see).

Scientific Name. The star of Bethlehem belongs to the family Liliaceae. Its botanical name is Ornithogalum umbellatum.

STAR OF THE SOUTH. See DIAMOND (Famous Diamonds).

STARR, ELLEN GATES. See ADDAMS, JANE;

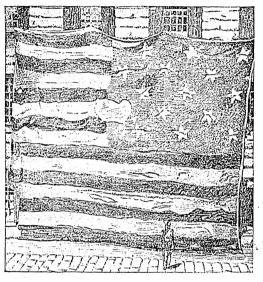
HULL HOUSE; SOCIAL SETTLEMENT.

STAR ROUTES, a name given to designated routes over which mail is carried in the United States when train or steamship transportation is not available. Private contracts are made with messengers; these contracts do not specify the means of carriage, but require for the service "celerity, certainty, and security," indicated by three stars on the registers of the Postoffice Department. The messenger receives the mail in bulk from the train or boat, and carries it to the postoffice which he serves, on foot, on horseback, by wagon, auto, or any means consistent with the three specifications. From there it is distributed to the proper addresses. The service is especially advantageous to people who live in districts remote from railroads. Free-delivery routes and ordinary routes over railroads or by steamboat are not called star routes. There are still many star routes in the United States, but, with the extension of railroad facilities, they are constantly decreasing in number and in importance.

Star Route Frauds. This term was applied to irregularities in the postal service on star routes, discovered in the last days of the administration of President Hayes. Fraudulent petitions were forwarded to the postoffice authorities in Washington, urging the creation of new star routes and furnishing "estimates" for carrying the mails over them at prices far above the necessary cost of the service. These estimates were allowed, and the money fraudulently. derived therefrom was divided among the parties to the plot. The guilty parties were finally exposed, and the conspiracy was broken up in the administrations of Garfield and Arthur. By estimate, the plot, if successful, would have defrauded the government of half a million dollars a year. T. J. Brady, Second Assistant Postmaster-General, and S. W. Dorsey, a Senator from Arkansas, were tried for complicity, but were acquitted. William P. Kellogg, a Senator from Louisiana, was also indicted, but his case was not tried.

STAR-SPANGLED BANNER, THE, national anthem of the United States, written by Francis Scott Key, and sung or played to an air composed by John Stafford Smith. Army and navy regulations designated this song as the national air long before Congress officially approved it in March, 1931. The objection that some of the notes were too high to be sung was met by changing the tune to a lower key.

How the Song Came to Be Written. After the burning of Washington, D. C., by the British soldiers, in August, 1814, Dr. William



"THE STAR-SPANGLED BANNER" The illustration is a drawing of the original flag which floated over Fort McHenry.

Beanes of Upper Marlborough, Md., threw three British refugees into jail, and for this he was arrested by the English forces and taken as a captive aboard a warship in Chesapeake Bay. John S. Skinner of Washington, and Key, then a young attorney in the District of Columbia, were granted permission by Secretary of State Tames Monroe to intercede for the doctor, and these two boarded the vessel just as it was preparing to bombard Fort McHenry, the chief protection of Baltimore. The British officers agreed to release Beanes, but refused to allow the two Americans to leave the vessel until after the battle, lest they should tell the plans to the patriots

On Tuesday, September 13, 1814, the bombardment began, continuing that day and almost all night. To Key and his companions, it seemed impossible that the fort could survive the attack, as its guns were small and its defenders were few. All night they walked the deck in anguish, and even when dawn came could not discover the outcome, because of haze

and smoke. Suddenly, at seven o'clock, a rift in the mist showed, for a moment, the flag gleaming over the walls. Thrilled by the sight, Key wrote the greater part of the poem in a few minutes on the back of an unfinished letter, and completed the stanzas that night in a Baltimore hotel. See illustration, page 7606.

The next morning, the poem was printed on handbills, and during that day Key's brother-in-law suggested that it be set to the old English drinking tune, Anacreon in Heaven, which was already familiar to Americans as the air for a political song entitled Adams and Liberty. A few days later, an actor named Ferdinand Durang first sang it in public at Baltimore. The composition immediately became popular, was played at the Battle of New Orleans, and is now played each evening at flag-lowering in every American fort and garrison, and on every American battleship throughout the world. The words of the song appear on this page.

By government permission the United States Flag is kept flying continually over Key's grave at Frederick, Md. On the other side of the continent, a great statue in memory of him, the gift of James Lick, looks out upon the Pacific at San Francisco. See illustrations, page 3769.

On September 13, 1914, the city of Baltimore celebrated with an appropriate program the hundredth anniversary of the writing of the song.

Related Subjects. The reader is referred in these volumes to the following articles:

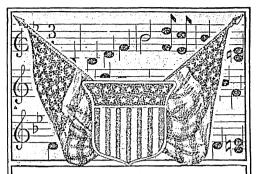
Baltimore (History) Hymns, National Key, Francis Scott War of 1812 (Story)

STARVATION. See Fasts and Fasting. STARVED ROCK. See La Salle, René ROBERT CAVELIER; ILLINOIS (Interesting Places to visit).

STATE, a group of persons who are permanently located within a definite territory, wholly independent of any outside control, living under an organized government which is their supreme authority, and to which all render allegiance. The ancient idea of the state was that of a system of tyranny, instituted for the purpose of forcing an unwilling service upon the people. The modern idea is that of a system of service for the people, to give them the largest possible freedom and to carry out the will of the people, collectively expressed. Sir William Jones patriotically summarized the true meaning of the word, in his poem beginning—

What constitutes a state? Not high-raised battlement, or labored mound, Thick wall or moated gate; Not cities fair, with spires and turrets crowned, But men, high-minded men. . . .

In the United States, the word is used for the political subdivisions of the Union. The name was originally chosen for each of the



The Star-Spangled Banner

[The third stanza is omitted.]
Oh! say, can you see, by the dawn's early light,

What so proudly we hailed at the twilight's last gleaming?

Whose broad stripes and bright stars, thro' the perilous fight,

O'er the ramparts we watched were so gallantly streaming?

streaming?
And the rockets' red glare, the bombs bursting in air,
Gave proof thro' the night that our flag was

Gave proof thro' the night that our mag was still there. Oh! say, does the star-spangled banner still

wave O'er the land of the free and the home of the

On the shore, dimly seen thro' the mist of the

THE THE PROPERTY OF THE PROPER

deep,
Where the foe's haughty host in dread silence reposes,

What is that which the breeze, o'er the towering steep,

As it fitfully blows, half conceals, half discloses? Now it catches the gleam of the morning's first beam,

In full glory reflected, now shines on the stream;

'Tis the star-spangled banner. Oh! long may it wave

O'er the land of the free and the home of the brave!

Oh! thus be it ever when freemen shall stand Between their loved homes and the war's desolation;

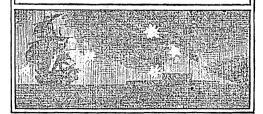
Blest with vict'ry and peace, may the heav'nrescued land

Praise the Pow'r that hath made and preserved us a nation.

Then, conquer we must, when our cause it is just,

And this be our motto, "In God is our trust."
And the star-spangled banner in triumph shall
wave

O'er the land of the free and the home of the brave.



OUTLINE ON THE STATE

T. Location

 Latitude
 Longitude
 Boundaries (a) Natural (b) Artificial

II. Size

(1) Length Breadth

> (a) Actual
> (b) Compared with that of provinces and other states

III. Physical Features

(1) General surface facts
(a) Mountains or hills
(b) Plains
(c) Watersheds (2) Effects on climate(3) Drainage

(a) Rivers (b) Lakes

IV. Climate (1) Conditions that might be expected, owing

to latitude
Variations and their cause

(3) Rainian (4) Healthfulness or unhealthfulness V. Resources and Industries

(1) Minerals (a) Varieties (b) Location Rank among states (2) Agriculture Crops Stock-raising

(c) Dairying (d) Rank among states (3) Fisheries

(a) Sea or inland (b) Rank among states (4) Manufacturers Principal articles produced

(b) Rank among states VI. Transportation and Commerce

Railways Rivers and canals

Commercial centers Value of trade

VII. The People

Population Density

Race
(a) Native Americans
(b) Foreign-born
Rate of increase

(4) Kate of increase (5) Special characteristics VIII. Government

(1) Departments
(a) Executive

(a) Executive
(b) Legislative
(c) Judicial Special features (2) Special features(3) State institutions

IX. Education and Religion

Public-school system Institutions of higher learning Churches represented

(a) Dominant religion X. History

Exploration First settlements Interesting events Admission to Union (4) Admission to 01 (5) Recent progress

thirteen colonies, after they declared themselves independent of Great Britain, and before they had adopted a Federal Constitution. At that time, each state was an independent, sovereign power. When, by the adoption of a common Constitution, they formed the United States of America, each gave up its sovereignty in regard to matters which directly concerned all the commonwealths, and so ceased to be a state in the highest political sense. It retained state sovereignty in everything pertaining to its local affairs; the Federal government then represented the real state.

The Study of a State. Like any other geographic unit, the state is best studied with the aid of an outline. The one given herewith is applicable to all the states of the American Union, despite the differences of detail which

must of necessity exist.

STATE, DEPARTMENT OF, one of the executive departments of the United States, established by act of Congress in 1789. Through this department the national government receives all communications from foreign countries, or from individual states of the Union. The departmental business is divided among a number of offices and divisions whose names indicate their functions, such as: divisions of American Republics; of Far Eastern Affairs; of Near Eastern Affairs; of European Affairs; of Foreign Service Administration; of Cultural Relations; of Commercial Treaties and Agreements; of International Conferences; of Current Information; of Communications and Records; Passport; and visa. The divisions and offices are administered by a corps of specialists and experts. The Under Secretary is the chief adviser to the Secretary of State. His salary is \$10,000 a year. The Secretary is also aided by four assistants and four special assistants, and a legal adviser.

The Secretary of State, like all other Cabinet officers, receives a salary of \$15,000 a year, and is appointed by the President, to whom he is responsible and under whose direction he works. He has charge of negotiation of treaties and of all correspondence with foreign nations, and is responsible for the publication of treaties, laws, and other public documents, and for the preservation of the originals. He is official keeper or custodian of the Great Seal of the United States, which must be affixed to proclamations, warrants, and appointments by the President. He receives foreign ministers and ambassadors and presents them to the President, and he also prepares the credentials of American representatives abroad (see DIPLOMACY). Passports are issued under his

authority.

These numerous duties, highest in importance in many respects in the government, make the head of the State Department logically the leader in the President's Cabinet.

The Secretary of State stands first in the line of succession to the Presidency in the event of the deaths or permanent disability of the President and Vice-President. Besides standing first in rank, the State Department is also the oldest, for it is merely a continuation, under another name, of the Department of Foreign Affairs, the first executive department established, in 1789, after the adoption of the Constitution. The position of the Secretary of State, while frequently compared to that of the Premier of Great Britain, is not like it, because the Premier is a legislator as well as an executive, and is responsible through Parliament to the people, whereas the Secretary of State is responsible only to the President, and has no influence, except such as his personal prestige commands, over Congress.

As the chief officer next to the President, in the executive department of the United States, quite overshadowing the Vice-President, the Secretary of State has almost invariably been a man of outstanding ability, and in a few instances the Secretary has overshadowed the President who appointed him. E.D.F.

Related Subjects. The reader is referred to the following articles in these volumes:

Cabinet Premier President Consul

Presidential Succession Act Diplomacy

STATE BANKS. See Banks and Banking, subhead.

STATE COLLEGE, PA., centrally located, is the home of Pennsylvania State College.

STATE COLLEGE FOR WOMEN. FLORIDA (Education).

STATE FLAGS. See color plate, article UNITED STATES.

STATE FLOWERS. See Flowers, subtitle. STATEN ISLAND, about five miles from the southern extremity of Manhattan Island, N. Y., was formerly the county of Richmond, but is now a part of Greater New York City. It constitutes the borough of Richmond. The island is triangular in shape, thirteen and onehalf miles long, with a maximum width of eight miles, and covers an area of fifty-seven square miles. It is connected by ferry with Manhattan and Brooklyn, and by vehicular bridges, completed in 1928, with New Jersey. Fort Wadsworth and Fort Tompkins, on Staten Island, command the Narrows and once were able to defend New York harbor. The chief towns are New Brighton, West New Brighton, Port Richmond, Stapleton, Tompkinsville, Tottenville, and Saint George. On Staten Island is the New York Foreign Trade Zone, opened in 1937, first port of the United States to permit duty-free re-exportation of foreign goods. Population, 174,441 (1940).

wampum, drilling awls, jew's-harps, and divers other small wares." See map in article NEW York City.

STATE POLICE. See Police, subhead.

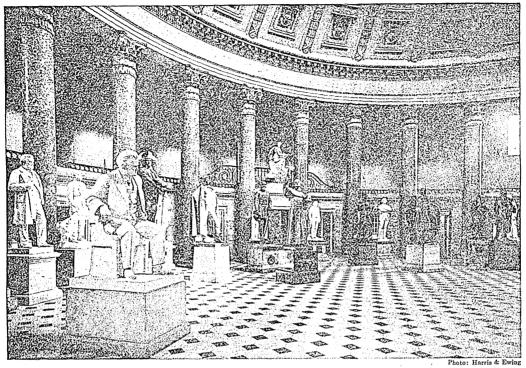
STATES-GENERAL, a legislative assembly in France which existed from 1302 until 1789. The term is also applied to the present Dutch Parliament. The States-General of France was composed of representatives of the clergy, the nobility, and the common people, who constituted what was known as the Third Estate. Until the States-General of 1484, the representatives of the clergy and the nobility were summoned personally by the king, while the representatives of the Third Estate were elected by the people they represented. After 1484, however, the representatives of all three classes were elected by vote.

The States-General did not meet at regular intervals, but was called together by the king in times of emergency, whenever he needed advice or money or moral support. Direct power belonged exclusively to the king, but the influence and indirect power of the States-General were at times very great. By the year 1614, however, the power of this assembly had declined to almost nothing. When it was again summoned, in 1789, the representatives of the Third Estate, who had been growing very powerful, made the famous decision which led to the French Revolution (which see), that the members of the States-General should constitute a national assembly with full sovereign powers, to be known as the National Constituent Assembly.

The States-General of the Netherlands, an assembly in which each province had one representative and one vote, was in existence at The Hague from 1593 until 1796, when it, too, became a National Assembly. The present Dutch Parliament, however, bears the name States-General (Staten Generaal).

STATES OF THE CHURCH, a name applied to the Papal States (which see).

STATES' RIGHTS, properly called state sovereignty, in American political history is the doctrine that the several states in uniting to form a Federal government in 1789 did not surrender their sovereignty. The doctrine was initiated by Jefferson and Madison in the Virginia and Kentucky Resolutions in protest against the Alien and Sedition Acts of 1798, and was vigorously opposed by Hamilton and the Federalists, who desired a strong central government. State sovereignty gave rise to the doctrine of nullification (the right of the state to nullify all unauthorized acts of the Federal government in its boundaries), developed by Calhoun, and officially adopted by South Carolina in 1832. The doctrine found a corol-The island was bought by the Dutch West lary in secession, applied by eleven Southern India Company in 1630 from the Indians, who states in 1860-1861. Their defeat in the War received in exchange "some kettles, axes, hoes, of Secession brought the downfall of the



STATUARY HALL-THE CAPITOL, WASHINGTON, D. C.

The half-dome ceiling is supported by twenty-two columns of Brecia marble with Corinthian capitals.

doctrine of state sovereignty. States' rights, meaning that the states have a jurisdiction that must not be invaded by the Federal government, is still frequently invoked. K.C.

STATE UNIVERSITIES. See section on Education, in each state article.

STATIC, stat' ik. See Electricity (Electricity in Motion); RADIO COMMUNICATION

(Glossary of Radio Terms).

STATICS, a branch of dynamics. Dynamics treats of the properties of matter and forces, and is divided into two branches—statics and kinetics. Statics deals with conditions under which there is no change of motion of material bodies when they are acted upon by various forces. When two or more forces so act upon a body as to produce no change of motion, they are said to be in equilibrium.

A.L.F.

Related Subjects. The following articles in these volumes should be read in this connection:

Composition of Motions and Forces

Force Mechanics

STATOR, sta' tor. See DYNAMO.

STATUARY HALL, a large, semicircular room with a half-dome ceiling in the Capitol at Washington. It is on the main floor abutting upon a quadrangle. Until 1857 it was the chamber of the House of Representatives. By act of Congress in 1864, it was created a memorial hall, to which each state may contribute two statues, to honor the men or women whom it

considers worthy of commemoration. The act reads as follows:

That the President be, and he is hereby, authorized to invite each and all the States to provide and furnish statues in marble or bronze, not exceeding two in number for each State, of men who have been citizens thereof and illustrious for their historic renown, or for distinguished civic or military services, such as each State shall determine to be worthy of this national commemoration; and that they be placed in the old hall of the House of Representatives in the Capitol of the United States, which is hereby set apart, or so much thereof as may be necessary, as a National Statuary Hall, for the purposes herein indicated.

In this hall the House of Representatives elected John Quincy Adams as President, in the momentous election of 1825; twenty-five years later, Fillmore took the oath of office on the day after Zachary Taylor died. Here Henry Clay, as Speaker, presided for many years over bitter debates on the War of 1812, on the Bank of the United States, and the tariff. Here Webster, Calhoun, Douglas, and Lincoln, among other great Americans, received their initiation into the nation's public life. These and other men discussed the issues which finally led to the War of Secession.

A list of the statues that have thus far been selected is given in the accompanying table. The only woman chosen is Frances E. Willard, whose statue was placed in the hall by Illinois, in 1905.

STATUES IN THE NATIONAL STATUARY HALL

CIRIOLO IN THE WATTOWNE DIRITORNE TRADE										
STATE	NAME	DATE PRESENTED	STATE	NAME	DATE PRESENTED					
Alabama	J. L. M. Curry	1906	Mississippi	Jefferson Davis	1931					
	Joseph Wheeler	1925	"	James Z. George	1930					
Arizona	John C. Greenway	1930	Missouri	Thomas H. Benton	1899					
Arkansas	Uriah M. Rose	1917	"	Francis P. Blair	1899					
	James P. Clarke	1921	Nebraska	William Jennings Bryan	1937					
California	Thomas S. King	1931	"	J. Sterling Morton	1937					
a "	Junipero Serra	1931	New Hampshire	John Stark	1894					
Connecticut	Roger Sherman	1872		Daniel Webster	1894					
T."	Jonathan Trumbull	1872	New Jersey	Philip Kearny	1888					
Delaware	John M. Clayton	1934		Richard Stockton	1888					
		1934	New York	George Clinton	1873					
Florida	John Gorrie	1914		Robert R. Livingston	1874					
	Gen. E. Kirby Smith	1918	North Carolina	Zebulon Baird Vance	1916					
Georgia	Crawford W. Long	1926		Charles Brantley Aycock	1932					
"	Alexander H. Stephens	1926	Ohio	James A. Garfield	1885					
Idaho	George L. Shoup	1909		William Allen	1887					
Illinois	James Shields	1893	Oklahoma	Sequoyah (George Guess)	1917					
T-di		1905		Will Rogers	1939					
Indiana		1899	Pennsylvania	Robert Fulton	1 1001					
Torre		1909	, ", _* , ,······	J. P. G. Muhlenberg	1889					
Iowa	James Harlan	1909	Rhode Island	Nathanael Greene	1869					
	Samuel J. Kirkwood	1913		Roger Williams	1870					
Kansas	John J. Ingalls	1904	South Carolina	John C. Calhoun	1909					
Kentucky	George W. Glick	1914		Wade Hampton	1929					
Kentucky	Henry Clay	1929	Tennessee	Andrew Jackson	1928					
	Ephraim McDowell	1929		John Sevier	1931					
Louisiana	Huey P. Long	1941	Texas	Stephen F. Austin	1904					
Maine	William King	1877	"	Samuel Houston	1904					
Maryland	Charles Carroll		Vermont	Ethan Allen	1875					
35	John Hanson			Jacob Collamer	1879					
Massachusetts	John Winthrop		Virginia	Robert E. Lee	1908					
Wishings		1873	777	George Washington	1908					
Michigan	Lewis Cass	1889	West Virginia	John E. Kenna						
		1913	1777	Francis H. Pierpont						
Minnesota	Henry Mower Rice	1916	Wisconsin	Jacques Marquette						
	l	1	"	Robert M. LaFollette	1929					

STATUE OF LIBERTY. See LIBERTY, STATUE OF.

STATUTE, an enactment of an authorized lawmaking body. Statute law is another term for written law, and is to be distinguished from unwritten, or common, law. The bodies by which statute law is enacted are known variously as Congress, Parliament, Assembly, Legislature, etc. The ordinances of city boards of aldermen, or councils, are examples of local statute law, as are the regulations adopted by boards of health. These are also called ordinances. The nature of statute law and its relations to other forms of law are discussed in these volumes under the heading Law. See COMMON LAW.

STATUTE OF LIMITATIONS. See DEBT. STATUTORY LAW. See Law.

STAUBBACH, shtoub' bah K, FALLS. See SWITZERLAND (Waters).

STAUFFEN, shtou' fen, Frederick of. See Hohenstaufen.

STAUNTON, VA. See Virginia (back of

map).
STAVANGER, stah' vahng ur. See Norway

(The Cities).
STAYSAIL SCHOONER. See YACHT AND YACHTING (Types of Rigs).

STEAD, sted, WILLIAM THOMAS (1849-1912), an English journalist, born at Embleton. He received little schooling, but by dint of hard work made himself one of the world's notable men. When he was twenty-two years old, he became editor of a small paper, The Northern

Echo, at Darlington, and was so successful that in 1880 he was offered the position of assistant editor of the Pall Mall Gazette in London, and three years later became its editor in chief. In that paper he began a campaign for laws to protect women and children from outrages, and in 1885 wrote so bitterly of conditions in The Maiden Tribute of Modern Babylon that he was imprisoned in London for three months, for libel. However, he had the satisfaction that year of seeing the laws passed for which he had striven.

EN STATEMENT OF THE SECOND STA

In 1890 he founded the English Review of Reviews, in 1891 the American Review of Reviews, and in 1894 the Australasian Review of Reviews. A visit to the czar of Russia in 1898 made him a zealous advocate of peace, and, subsequently, his weekly paper, War Against War, devoted largely to attacks on Great Britain's part in the Boer War, together with numerous pamphlets urging arbitration, did much to direct public sentiment toward peace.

About 1905 Stead became a convert to spiritualism. Later he started for New York where he planned to establish a spiritualist organization, but he met his death when the *Titanic* sank in April, 1912.

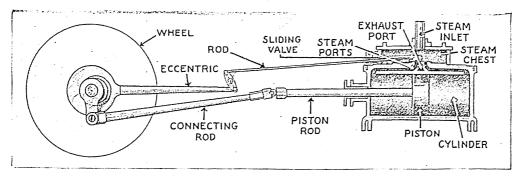
His Books. Stead was the author of The Truth about Russia, A Study of Despairing Democracy, The United States of Europe, and If Christ Came to Chicago.

STEAM, steem. If you ask the average person whether he has ever seen steam, he will



From the painting by David Neal

Watt Discovering the Power of Steam. As a boy, James Watt lived in Greenock, a fishing town in Scotland, where his father was a merchant and shipyard-owner. The lad was not strong enough to attend school regularly, and he had ample leisure for using hand tools, in which he delighted, and for studying and investigation. There is a persistent story—the one depicted in the painting reproduced herewith—that Watt came to realize the power inherent in steam by watching the lid of his mother's teakettle as it bobbed up and down when the water was boiling. Like the story of Newton and the falling apple, this tradition cannot be verified, but it may very well have a basis of truth. The story has been made the theme of more than one painting. David Neal (1838-1915), who painted the picture shown above, was an American artist, born at Lowell, Mass. He studied abroad for several years after 1862, and his canvases represent the technique of the Munich (Germany) school, rather than American ideals. The Watt picture was exhibited at the Royal Academy in London, in 1874, but a more famous work is his Oliver Cromwell and John Milton, now a possession of the Cleveland (Ohio) Public Library. His First Meeting of Mary Stuart and Rizzio was awarded the Great Medal of the Royal Bavarian Academy. Chapel of the Kings at Westminster is in the F. Cutting collection, Boston. In the Lowell (Mass.) Public Library is the canvas entitled The Rialto, Venice.



PRINCIPAL PARTS OF A STEAM ENGINE

answer "Yes." But he will be mistaken, for steam is colorless and invisible. Sometimes, in watching the cloud that comes from the spout of a teakettle of boiling water, you may notice that the vapor, which is mistakenly called steam, begins an inch or so from the spout. In the seemingly vacant space is the real steam, which is water transformed into gas; the visible cloud is water changed back into tiny particles of liquid by the cooler temperature of the air.

Steam may be caused by evaporation or by boiling, but hot steam almost always is meant when the word is used. When water is heated to the boiling point, 212° F., bubbles of steam begin to rise through it. Until all the liquid has become gas, the temperature will remain at the boiling point. Meanwhile, five and one-third times as much heat will have been expended as was necessary to raise the temperature from the freezing to the boiling point. This heat is known as the latent heat of steam, because it will be given off again when the gas is condensed to water.

Steam occupies more space than the water from which it comes. Just at the moment when boiling ceases, the gas is 1,644 times as great in volume as the former liquid. At this stage, it is called saturated steam. If heated further, its temperature and volume continue to increase, and it is known as superheated steam. This tendency to expansion makes possible the steam engine. Wet steam supports particles of water still in liquid form; dry steam contains only gas.

A.L.F.

Related Subjects. The reader is referred to:

Boiling Point Ship Steam Hammer
Evaporation Steam Engine Steam Shovel

STEAMBOAT. See Fitch, John; Fulton, Robert.

STEAM ENGINE. Nothing is more characteristic of modern civilization than the change from muscular to mechanical power for performing the work of the world. In this transformation, the steam engine has played a major part. It has revolutionized methods of transportation, commerce, manufacture,

and building construction. It has made possible most of the developments which constitute the progress of the modern age.

Yet the principle of the steam engine is simple. Energy is never lost; it may be changed from one kind of energy to another, or it may remain latent, or sleeping, for countless ages; but it is still capable of doing work. So man takes coal, in which energy has been stored by nature, burns it to bring out its energy in the form of heat, and places over the fire a boiler of water, to absorb the heat. When the water reaches the boiling point, its molecules begin to move apart, driven by the energy that was in the coal, but is now in a form in which, in its efforts to expand the steam, it will turn wheels for man.

AN THE REPORT OF THE PROPERTY OF THE PROPERTY

A century before the Christian Era, there was in Alexandria a man named Hero, who experimented with steam and constructed a device which was like a Barker's mill, but which whirled by steam instead of water (see BARKER'S MILL). Nearly 2,000 years elapsed before the science of steam engineering advanced, and then, in the first year of the seventeenth century, an Italian named Della Porta wrote a book which told how to build a fountain whose waters would bubble up from the pressure of steam, and which stated that, when the steam cooled, it would condense and draw up more water from below. Upon this power of condensation inventors relied as much as upon expansion, until the nineteenth century. The first engine of actual service, patented in England in 1698, was a pump which was but an elaboration of Della Porta's fountain, and the Newcomen engine, the best-known when James Watt began his experiments in 1763, made no attempt at all to utilize the expansive power of steam.

Probably most people believe that James Watt (which see) was the inventor of the steam engine, and millions are familiar with the picture which shows him, an interested boy, watching the steam clouds from the kettle. But Watt was only the improver, not the inventor. What he accomplished for the world was to reduce the cost of operating a

condensing engine, and to make it practical for other things than pumping

The Newcomen engine set Watt to thinking, because it consumed an enormous quantity of steam, hence large amounts of fuel. It had a cylinder and a piston (see the illustration for explanation of these terms). The piston rod hung from one end of a beam, and the weight to be lifted was suspended from the other end. The beam was pivoted at the center, so that, like a seesaw, one end went up when the other end went down. Steam was admitted below the piston, whereupon the counterweight pulled the piston up. Cold water was then injected into the cylinder, so that the steam condensed

and made a partial vacuum beneath the piston. The top of the piston was open to the air, which, of course, exerted a pressure of nearly fifteen pounds to the square inch on it, and, when the vacuum was created beneath it, forced it down.

Watt saw that the alternate heating and cooling of the cylinder required large quantities of otherwise unnecessary heat. So he devised an engine in which the condenser and the cylinder were separate, and the latter always remained hot. As a result, threefourths of the

fuel cost for operating steam engines was eliminated.

Watt took out his first patent in 1769, and from that date we count the era of steam. He continued to make improvements on engines, perhaps the most important of which was the introduction of the principle of double action, in which steam is used first on one side of the piston, then on the other, as in the engine illustrated on page 6819. He also learned to shut off the steam when the cylinder was only partly filled, relying on expansion to complete the stroke. But he never experimented in the use of high-pressure steam; his own pressures were not much greater than the fifteen pounds per square inch of the air, while to-day, pressures of over 1,000 pounds are practical and are frequently employed.

The engine of Watt was of the reciprocating type—the cylinder and piston being employed for the utilization of the power. Since his day it has been vastly improved, not only by employing higher pressure, mentioned above, but by the development known as the compound engine, in which high-pressure steam does work in one cylinder, then passes to another, or even to a third and a fourth. A further improvement was accomplished through the principle of superheating, which consists in raising the steam to such a high temperature (about 700° F.) that the exchange of heat which occurs between the steam and the metal of the cylinder is greatly reduced.

Another radical improvement in steam engineering was the introduc-

A BATTERY OF POWER HAMMERS

tion of the turbine engine, in which the pressure, instead of being exerted on a piston, is employed to give momentum to blades mounted on a revolvingshaft or drum. The turbine is especially effective in developing power on a large scale, or in cases where a high speed of rotation is desired. It is almost universally employed in power stations and ships. See RAILROAD; SHIP; LOCOMO-TIVE; INDUSTRIAL REVOLUTION.

STEAM HAM-

MER. The steam hammer, invented by James Nasmyth in 1839, revolutionized all industries in which heavy forging was necessary. Nasmyth hammer, as it was originally called, was raised by steam admitted into a cylinder beneath it. When the hammer was raised to the required height, the steam was allowed to escape and the hammerhead fell by force of gravity. The head might weigh 100 pounds, or as much as 100 tons. The first model was not a practical success, but subsequent improvements by one of Nasmyth's associates resulted in a device of great mechanical power. In the modern steam hammer, which is based on the first machines, steam is admitted alternately above and below the hammerhead, the pressure of the steam from above adding to the force of the downward stroke. So perfect is the control



Photo: Panama Canal. Washington Office

STEAM SHOVEL AT WORK IN THE PANAMA CANAL

of these mighty hammers that a blow with a force of hundreds of tons may be given, or one so gentle as to crack a nut without injuring the kernel. The steam drop hammer is raised like all steam hammers, by the pressure of steam admitted below the piston; but it drops by its own weight only. See NASMYTH, JAMES.

STEAM HEAT. See HEATING AND VENTILATION (The Heating Problem).

STEAMSHIP. See Ship.

STEAM SHOVEL, shuv' 'l, a large scoop operated by steam power. The scoop, or bucket, is attached to a beam which can be moved in any direction and raised and lowered at will, power being applied from a hoisting engine. The bucket is of iron or steel, with a capacity of one-half cubic yard to twelve cubic yards. It has teeth arranged along the front, so as to cut into earth or loose rock. The bottom is hung on a hinge, so that, when a catch is released, the load may be emptied instantly. The method of operation is quite simple. The dipper is lowered to the ground and driven forward and upward with a powerful sweep, gathering earth and rock as it goes. The beam is then swung into any desired position, and the

shovel emptied into cars or wagons, which remove the earth.

Commonly, all the parts of a steam shovel are mounted on a movable car. The great steam shovels with which the Panama Canal was excavated were capable of handling from four to five thousand cubic yards of rock or ore in a day. Steam shovels are extensively used in digging and loading ore in the iron mines of the Great Lakes region, and for all kinds of excavation work. Many of the larger shovels are operated by electricity.

STEAPSIN, ste ap' sin. See PANCREATIN. STEARIC, ste air' ik, ACID, a solid, fatty acid which, when combined with glycerine, forms stearin, an important constituent of

fats. See STEARIN.

STEARIN, ste' a rin, a combination of stearic acid and glycerine, is the chief ingredient in mutton suet, beef tallow, and certain vegetable fats, such as palm oil. When crystallized, stearin forms pearly, waxlike scales, having neither taste nor odor, soft to the touch, and not greasy. It cannot be dissolved in water, but is soluble in ether and hot alcohol. When treated with superheated steam, it is resolved

into its component parts—glycerine and stearic acid. When stearin is boiled with alkali, the stearic acid combines with the alkali to form soap, and the glycerine is separated. Stearin is prepared for practical use from beef suet, cottonseed oil, and other fats. It yields an oil employed in the manufacture of butterine. Stearin is a complicated compound of carbon, hydrogen, and oxygen.

STEATITE, ste' a tite, a soft rock, composed chiefly of talc. It has a soapy or greasy feel, and ranges in color from light gray to almost black. Steatite is easily sawed into slabs, and was formerly used in the manufacture of stoves in which wood was used for a fuel. The socalled French chalk is made of pulverized steatite. In localities having cold winters, small blocks of steatite are used for footstones, because they hold the heat for a long time. In New England, these stones are called freestones. Similar stones are used at the present time in fireless cookers. Steatite is also used as a filler in the manufacture of paper. Because of its peculiar oily feel, steatite is often called Among the American Indians, soabstone. soapstone was sometimes used for the mortars in which they ground their corn. Other uses for steatite are in the manufacture of "lava" tips for gas burners, for electrical insulation, as a filler for paint and rubber goods, as a lubricant, and as slabs for laundry tubs and sinks. See TALC.

STEDMAN, EDMUND CLARENCE (1833-1908), an American poet and critic, born in

Hartford, Conn. He studied at Yale, became editor of the Norwich Tribune in 1852, and later was connected with several other papers, serving on the New York Tribune, and as a war correspondent for the New York World, during the War of Secession. In 1860 he entered on a business career as a banker and broker, and retired from active life in 1900.



EDMUND CLARENCE STED-MAN

But his chief interest was always in literary work. The Diamond Wedding, a satire on society in verse, first attracted general attention to him. His Alice of Monmouth is the best narrative poem inspired by the War of Secession, but perhaps the best-known of his verses is Pan in Wall Street. For twenty years Stedman devoted himself to critical writing, but in his last years returned to poetry.

Other Works. Victorian Poets and Poets of America, his first critical works, he supplemented by A

Victorian Anthology and An American Anthology. He aided in the preparation of an eleven-volume Library of American Literature, and edited, with George E. Woodberry, The Works of Edgar Allan Poe.

STEEL. See Iron and Steel.

STEELE, SIR RICHARD (1672-1729), an important British writer of the early eighteenth century. To-day, he is remembered chiefly for his part in the development of the essay, though in his own day he was a successful playwright. Steele was born in Dublin, and educated at Charterhouse School and at Oxford. At Charterhouse he formed a friendship

with Joseph Addison, afterward his associate in the periodicals for which the two are famous. Steele had a varied career. He served in the army, rising to the rank of captain, held various political offices, sat in Parliament, and found time to write witty plays, compose mediocre poetry, and establish periodicals and contribute to them. Though he earned comfortable sums of



Photo: Brown Bros

RICHARD STEELE

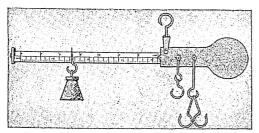
money, he was too impulsive, carefree, and generous to keep out of financial trouble, and spent his last years in retirement in Wales.

His Place in Literature. Steele has been called "the father of the English essay," but it is more correct to say that he took a form of literature already invented, and, with Addison, created a distinct type of essay, one that has endured. Steele founded the Tatler in 1709, and wrote most of the essays for it. though Addison contributed forty-two before the Within two periodical ceased to exist, in 1711. months, the friends had started the famous Spectator, which contains Addison's finest work. It was succeeded by the Guardian, and by several others, some of which Steele utilized for political arguing. generally agreed that Steele was inferior to Addison as a stylist, but he deserves enduring fame as the originator of the plan by which the essay became the mirror of contemporary manners. See Addison,

STEELHEAD. See SALMON TROUT; TROUT. STEELTON, PA. See PENNSYLVANIA (back of map).

STEELYARD, in mechanics, a device once in common use for weighing groceries and other commodities. It is of ancient origin, for it was employed by the Egyptians and Romans. It consists of an iron bar having one long arm and one short one, and is a lever of the first class (see Lever). The article to be weighed is usually hung by a hook, or scale pan, from the end of the short arm; the counterpoise, whose weight is known, is hung on the long

arm, which is marked off into notches (see illustration). To obtain the weight of an article, the movable weight is shifted on the



THE COMMON STEELYARD

long arm until there is a balance, and the number at which the weight rests indicates the number of pounds or other units. The device is usually hung from a fixed support by a ring or hook. See Weighing Scale.

STEEN, stayn, JAN (1626-1679), a foremost painter of Holland, ranking next to Rembrandt, among painters of the Dutch school, in range of subjects and ability to portray scenes of everyday life with dramatic effect. Like the English painter Hogarth, he could put a touch of satire into his work, but usually he painted with genial good humor. There was no phase of Dutch life that Steen did not depict; he represented with admirable insight the joys and the sorrows of people in all classes of society. His best canvases are distinguished for their clear coloring and excellence of composition. That he was an industrious worker is known from the large number of pictures he leftabout a thousand, according to one authority. Aside from the facts that he was born in Leyden and studied in Utrecht and Haarlem, little that is authentic is known of his life.

Representative Paintings. Among Steen's notable works are Eve of Saint Nicholas, The Rustic Wedding (both at Amsterdam), The Menagerie (The Hague), and The Music Master (National Gallery, London). The Metropolitan Museum, New York, possesses three examples of his work.

STEENBOCK, HARRY. See HUMAN GROWTH.

STEENBOK, steen' bahk, or STEINBOK. See STEINBOK.

STEEPLEBUSH. See SPIRAEA.

STEFÁNSSON, sta' fahns sohn, VILHJALMUR (1879-), discoverer of new land in the Arctic Ocean, was born in Manitoba of Icelandic parents, and educated in the United States. He made several trips to the far north before the Canadian government sent him to explore the northern shores of Canada and Alaska. About six months after sailing from Victoria, B. C., in June, 1913, the Karluk, largest of the three expedition boats, prepared for three years of scientific work, was caught in the ice and sank, with a loss of eleven lives.

Stefansson, with several companions, happened to be ashore hunting caribou, and, undismayed, resumed the journey by sledge. With two men and six dogs, the explorer crossed Beaufort Sea on moving ice, surveying

large areas from Martin Point to Banks Island. In 1915 he discovered the mountainous region to the north and west of Prince Patrick Island. During the next two years he explored unknown land west of Axel Heiberg Island. He returned to Canada In 1924, in 1018. he led an expedition into central Australia. In recent years



AND THE PROPERTY OF THE PROPER

STEFÁNSSON

he has lectured at universities in the United States and Europe.

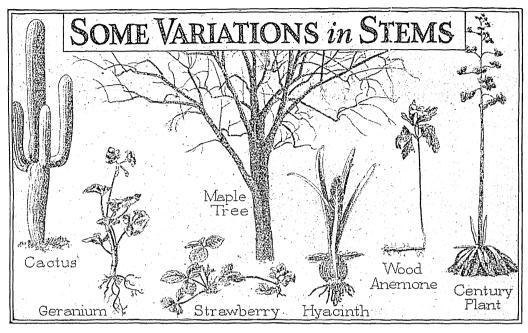
Writings. Stefánsson's written works include The Friendly Arctic; My Life with the Eskimo; Hunters of the Great North; The Adventure of Wrangel Island; The Standardization of Error; Adventures in Error; Unsolved Mysteries of the Arctic; and various anthropological reports.

STEGOSAURUS, steg o saw' rus, a prehistoric monster. See illustration in the article DINOSAURIA.

STEINBOK, stine' bahk, or STEENBOK, a very small antelope found in the southern part of Africa. Its Dutch name, which means stone-buck, was given because it is usually found in rocky places. The steinbok is about twenty-four inches tall, and has a reddish-brown coat that is white underneath. The male has two forward-curving ringed horns, about four inches long. The European ibex is also called a steinbok. See Antelope; IBEX. W.N.H.

Scientific Name. The steinbok belongs to the family Bovidae. Its scientific name is Nanotragus campestris.

STEINMETZ, CHARLES PROTEUS (1865-1923), "the little cripple with a giant mind, was accounted the greatest electrical genius of his day, with the exception of Thomas A. Edison. He was born in Breslau, Germany, and educated in Breslau, Berlin, and Zurich, Switzerland. He received his middle name, Proteus, from his fellow students in Breslau University, as a tribute to his versatility. The devotion of an American student in Zurich brought him to the United States. When the young man had to return home, he offered to divide his money with Steinmetz if the latter would come with him. As Steinmetz was exiled from Germany because of his socialist activities, he readily agreed.



In 1893 he joined the engineering force of the General Electric Company in Schenectady, N. Y. True to his socialistic views, he refused to accept any salary other than living expenses. He was at the head of a magnificently equipped laboratory, where he carried on his amazing electrical experi-

ments. He invented the induction regulator, the metallic-electrode arc lamp, and an electric automobile, and did much to further the progress of applied industrial chemistry. A remarkable ability to explain in simple language the most abstruse problems makes his many technical books of interest even to a layman.



CHARLES P. STEINMETZ

Steinmetz was professor of electrophysics in Union University from 1902 until his death, president of the city council of Schenectady, and president of the board of education.

STELLA. See Swift, Jonathan (His Literary Career: Early Discouragements).

STELLER SEA LION. See SEAL (Other Seals).

STELLITE, stel' ite. See Alloy.

STEM, the stalk of a plant, shrub, or tree, which supports the leaves in the most advantageous position to receive light and air. It is a coworker with the leaves in changing into

plant food the raw materials obtained from the soil. The water and dissolved salts taken in by the roots are carried to the leaves by the stem. There, primarily, they are converted into plant food, for it is in the leaves that the inorganic substances, water and carbon dioxide, are used as building materials for sugarpresumably, the first organic product to be manufactured in the unceasing mills of vegetation and crops. The energy for this process is furnished by sunlight. As indicated elsewhere, the chief channels of conduction of all the successive organic products formed in green tissues-and used throughout leaf, stem, and root as nourishment—are certain portions of the vascular bundles, termed the sieve tubes, or sieve-tube system. In one large class of plants (dicotyledons), this system is normally located in the inner bark.

In green-stemmed plants, the stem, of course, shares the work of food manufacture, but green tissue in the stem disappears when the light is excluded, by the development of a thick, corky bark. In any case, the stem contributes, each season, a full share of new growth—of the permanent new growth—while it serves also as a distributing channel and as support. In leafless plants like the cactus, the thick, green stems, which are usually broad and flattened, exposing a large surface to the light and air, perform the functions of the leaves. The fleshy stalk also holds water, supplying the plant in times of drought. This reserve water has allayed the thirst of many a traveler in the arid plains of Southwestern United States. Some desert plants are able to withstand drought for ten years or more.

The stems of marsh and water plants contain passages and cavities filled with air, supplying the plant when it is submerged, and buoying up the leaves (see AIR SPACES).

Structure and Growth. If a leafstalk of celery is allowed to stand in an aniline dye and then removed and examined, it will be seen that there are definitely stained regions, showing that the liquid passed upward into the leaf by certain tissues, or bundles of long, narrow, tubular cells. The actual path is through the xylem, or woody part of the fibrovascular bundles, whose name means collections of threadlike, woody tubes. Those plants in which the bundles of cells are distributed irregularly throughout the stem, as in the cornstalk, are the monocotyledons. The group in which the bundles are arranged radially around the pith, as in our common trees, are in general the distributed are

dicotyledons.

The stems of the latter plants consist of an outer protective covering of bark and woody layers extending to the pith. The cells are of several kinds. In the bark there may be cork layers, preventing loss of water; flexible, tough, fibrous cells giving strength to the stem; sieve tubes carrying the plant food from the leaves; and woody cells forming the channel through which the water passes to the leaves from the root. Between bark and wood is a layer of growing tissue, the cambium, whose function it is to form new bark on the outer side, and new wood on the inner side. The lifetime of a tree is reckoned from the number of rings or layers of new wood formed by these growing cells.

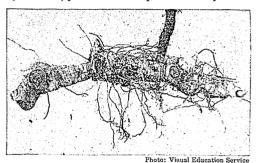
In some plants, the stems live but a year, in others two years, and in still others, indefinitely. The death of certain annual plants is not due to the arrival of cold weather, as is often supposed, but to the fact that, after fruiting, growth stops and the plants die. Thus the life of the plant may be limited to a certain period, even in regions where there is no cold

winter and not even a single frost.

Stems vary greatly in thickness, ranging in width from the immense trunks of the big trees of California to the slender aspen stem which is so delicate that the leaves constantly quiver and softly rustle, giving the tree the name "trembling-leaved poplar." The rate of growth also varies in different plants. The sunflower and giant ragweed stalks grow ten or twelve feet in a season, and slender, climbing stems often grow forty feet in a single summer, while many trees increase in height but one to three inches a year. In the competition to secure light and air, trees in dense forests and plants in thick clumps grow tall and branchless for a great height, but when growing alone, they are low and broad-topped.

Underground Stems. The long, slender rootstocks of the May apple, Solomon's seal, mints, and several other plants, the short, thick bulbs of the hyacinth and lily, and the familiar tuber of the potato are underground stems. They contain large quantities of reserve food, and supply the plant when new food cannot be made. Some produce aerial stems; others send up leaves and have no stem above the ground.

Reproduction by Stems. Many plants are reproduced by portions of the stem. Our most obnoxious weeds are those which have underground stems, or rootstocks, which, though cut by the hoe, produce a new plant at every node.



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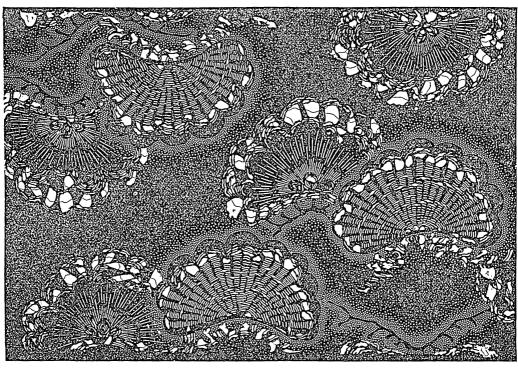
UNDERGROUND STEM OF SOLOMON'S SEAL

The slender runners of the strawberry, the bulbs of the lily, and tubers of the potato also produce new plants. The black raspberry forms a new bush by the rooting of an ordinary branch, and many plants, such as the snap willow, geranium, grapevine, and current bush, are reproduced from cuttings, or broken-off stems, which take root when planted. The propagation of orchard trees by budding and grafting is a very important practice.

Economic Uses of Stems. The food obtained from the stems of plants is of great importance to man and animal. Cane sugar and molasses and maple sugar and syrup are produced by the stems of the sugar cane and maple tree; the edible parts of potatoes and onions are underground stems; asparagus, celery, and other vegetables are aerial shoots; syrup is derived from cornstalks, which also are an important food of horses and cattle. The fleshy stems of the prickly-pear cactus of the thornless variety are another valuable cattle food, and many wild animals, such as the deer, moose, and rabbit, browse on the twigs and stems of numerous plants. Common starch is derived from the potato, and sago is made from the starchy pith of the trunk of the palm tree. Perhaps most important of all has been the employment of the wood of trees for building purposes.

Related Subjects. The reader is referred in these volumes to the following articles:

Annuals Biennials Botany Bulb Cotyledon Grafting Leaves Perennials Sap Tree



A JAPANESE STENCIL OF REMARKABLE BEAUTY

STENCIL, sten' sil, a thin sheet of metal or other material with a pattern cut out by means of interrupted lines or dots. It is used in reproducing letters and designs. The stencil is placed on the surface or material to be ornamented, and a brush or sponge wet with ink

or paint is passed over it. Packing boxes are often marked with stencils, and the process is employed extensively in embellishing curtains, bed covers, garments, and other household articles. Furniture also lends itself to sten-Churches and other public buildings are often decorated on the interior with stencil designs. Because of its practical value, the process is taught in schools and applied-art classes. See Industrial ART; MIMEOGRAPH.

STENOGRAPHY. See SHORTHAND WRIT-ING.

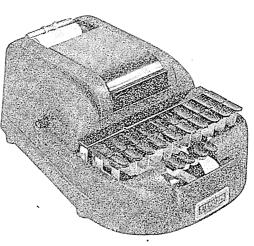
STENOTYPE, a machine used to record dictation or speech rapidly and accurately; tape of paper which progresses automatically, in other words, a shorthand machine. The a line with each stroke, and each symbol

stenotype has a keyboard of twenty-three keys, so spaced that two may be struck with one finger, with an ease and silence of operation that cause a minimum strain on the nerves. The characters are the English alphabet, arranged so that the fingers of the left hand

print the beginning consonants of a word, the right hand the concluding consonants, and the thumbs the vowels. Several letters of the alphabet have been omitted, to simplify operation, and they are supplied by combinations which may be printed by a single stroke; thus, a begin-ning consonant "B" is represented by striking simultaneously the two letters "PW."

A system of simplified spelling is employed. All silent letters are dropped, and words most frequently used are written with a single

letter. The notes are printed on a narrow



THE STENOTYPE

always occupies the same position in the line. The notes have the advantage of being easily transcribed by anyone familiar with stenotypy. The simple sentence "He was at our house" would appear:

Most words may be written with a single stroke, and many phrases require only one stroke. A stenographer, W. S. Ireland, invented the machine. See also Shorthand.

STEPHEN, ste' ven (about 1097-1154), a king of England, whose reign, lasting from 1135 to 1154, was one of the darkest in English history. He was the third son of Stephen, Count of Blois, and Adela, daughter of William the Conqueror, and was a nephew of Henry I of England. In return for taking an oath to secure the succession of Matilda, the king's daughter, he was given large estates in Normandy, as Prince William, the rightful heir, was drowned. On the death of King Henry, in 1135, Stephen hastened from Normandy to England, laid claim to the throne on the ground that his early vows were made under compulsion, and was crowned king in Westminster Abbey. After Matilda, with her half-brother, the Earl of Gloucester, landed in England, revolts broke out, Stephen was imprisoned, and Matilda acknowledged queen. The war was renewed and lasted for nearly seventeen years, plunging England into misery. According to the peace treaty, made in 1153, Stephen was to retain the kingdom until his death, but was to be succeeded by Matilda's son, Henry of Anjou, first of the Plantagenet line. See HENRY (England); PLANTAGENET.

STEPHEN, the first Christian martyr. He was stoned to death on the streets of Jerusalem, after the Ascension of Christ. Although only one of the seven deacons appointed by the Apostles to minister to the poor, Stephen was a man of great piety and performed miracles. He preached eloquently of salvation through belief in Christ, but, by minimizing the importance of Mosaic customs and institutions, especially those pertaining to the Temple, he antagonized the Jews. Accused of blasphemy and brought to trial before the Sanhedrin, Stephen defended himself with a masterly speech (Acts VII). He proved that he was not speaking against the "Temple and the Law," but that, by persecuting him, his accusers were disobeying the Law. Infuriated, the mob attacked and killed him. Saul, who had not yet been converted, witnessed the tragedy, and "was consenting unto his death."

December 26 is celebrated in the Roman Catholic Church and the Church of England as Saint Stephen's Day. A minor celebration

is held on August 3, the date on which his relics are supposed to have been discovered, in 415.

STEPHENS, ALEXANDER HAMILTON (1812-1883), an American lawyer and statesman and Vice-President of the Confederate States of America, born near Crawfordsville, Ga. He entered Franklin College, now the University of Georgia, with the view of becoming a

minister, an educational society defraying his expenses. In 1834 he passed a law examination, was admitted to the bar, and also taught school to repay those who had helped him. From 1836 to 1842, he was a member of the state legislature, and from 1843 to 1859, he was a Representative from Georgia in Congress. He was strongly opposed to secession in 1861, but remained loyal to his state when Georgia seceded. Stephens



ALEXANDER H. STEPHENS
One of the great leaders of
the Confederate States of
America from 1860 to the
end of the War of Secession.

was elected to the Confederate Provisional Congress, and was later chosen Vice-President of the new government, but was often at variance with President Davis, on questions of states' rights.

In February, 1865, he headed the unsuccessful peace commission which conferred with President Lincoln at Hampton Roads (see Hampton Roads Conference). He left Richmond before the war ended, and after the downfall of the Confederacy, was arrested and imprisoned for six months at Fort Warren, in Boston Harbor. In 1866 he was elected to the United States Senate, but was not permitted to take his seat; so he turned his attention to writing the first volume of The War Between the States. Being in reduced circumstances, he taught law classes in 1871, and also served as editor of the Atlanta Sun, which was published to defeat Horace Greeley for the Presidency. He was elected governor of Georgia in 1882 by 60,000 majority, and died in office. His statue is in Statuary Hall (which see).

His Writings. In addition to the above-mentioned book, which presents the Southern viewpoint on state sovereignty and secession, Stephens also wrote an answer to his critics, *The Reviewers Reviewed*, and *A School History of the United States*.

STEPHENSON, the family name of two British engineers, father and son, both of whom made valuable contributions to the development of England's railway system.

George Stephenson (1781-1848), the elder Stephenson, won the name of "founder of railways." He was born at Wylam, near Newcastle. After working on a farm, he assisted his father as fireman in a colliery. His first invention was a miner's safety lamp; next he worked out the idea of applying steam power to locomotive engines, and set one to work in 1814 to operate on a colliery tramway. An improved engine, completed the following year, continues, with

Watt's steam engine, to serve as the model in locomotive construction.

Stephenson was appointed chief engineer of the Stockton & Darlington Railway in 1821. Three years later, he became engineer of the Liverpool & Manchester Railway, whose formal opening, in 1830 (see RAILROAD), marked the real beginning of the British railway system. This railroad purchased his famous yet crude locomotive, the "Rocket." which attained the then amazing speed of nearly

LOCOMOTIVE.



GEORGE STEPHENSON The first "railroad man."

6828

thirty miles per hour. Before long, Stephenson's reputation was so great that he was consulted on every large engineering project of his time.

Robert Stephenson (1803-1859), the son of George Stephenson, was born at Willington Quay. He supplemented a good general education with science courses at the University of Edinburgh. After assisting his father in railway surveying, in 1824 he went to South America to take charge of mining operations, and on his return to England helped in the building of the locomotive known as the "Rocket," which won a prize of £500 (\$2,500). He afterward became chief engineer on the construction of the first railway to enter London, known then as the London & Birmingham Railway.

Robert Stephenson was, however, chiefly noted for the engineering genius shown in the great bridges and viaducts constructed by him. He invented the tubular bridge, and also introduced the use of tubular girders in the construction of iron bridges. Especially notable achievements are the high-level bridge at Newcastle, the famous Britannia tubular bridge over Menai Strait, and the Victoria Bridge across the Saint Lawrence River, at Montreal. Stephenson visited Germany, Switzerland, and many other parts of Europe, and Canada, Egypt, and India, for the purpose of building railways in those countries. Taking considerable interest in the political affairs of his country, he was elected a member of Parliament for Whitby, Yorkshire.

STEPPES, steps, the Russian name for the extensive, treeless lands stretching through the Ukraine, eastward to the Caspian Sea, and yet farther to the Altai Mountains in Central Asia. Within the European Russian steppes, and slightly to the north of them, lies the vast "black-earth" plain, the best agricultural section of the Soviet republic, where enormous quantities of grain are raised. In the steppes

of Asiatic Russia during the spring, when the rains start the grass growing, great herds of cattle, sheep, and horses graze; but they are soon led to better pasturage by the Tartars, Kirghizes, and other natives, for the summer droughts dry up the lands.

The semi-arid plains of North America and South America are similar in geographical aspect to the steppes. See also Russia

(Plants: Agriculture);

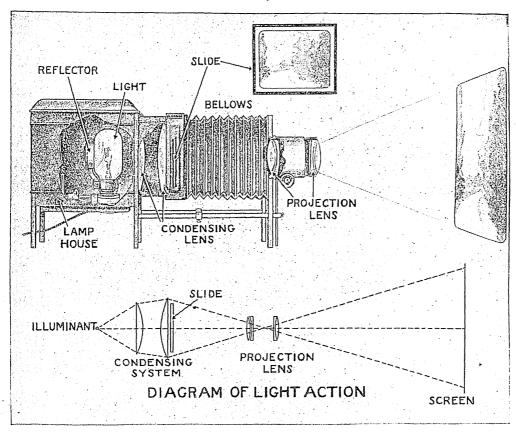
UKRAINE. STEREOPTICON, stehr e op' tih kon, an apparatus for projecting on a white surface a magnified image of a picture. The principal parts of the apparatus are the lantern, or box for enclosing the light, the condenser, the objective, and the light. The lantern box, which is usually made of sheet iron of the best quality, has openings at the top and bottom to provide thorough ventilation. A door on the side next to the operator gives ready access to the light. The condenser consists of a large, double-convex lens (see Lens), or, more frequently, of two plano-convex lenses with their curved surfaces facing each other. The purpose of the condenser is to gather the rays of light and throw them upon the picture to be projected. The objective of a good stereopticon consists of two double-convex lenses and a double-concave lens mounted in a tube of the right length to enable each lens to aid in magnifying the picture. This tube is mounted in a frame with a rack and pinion, enabling the operator so to adjust the focus of the objective to the condenser as to get a sharp definition of the picture on the screen.

The Light. Various devices are used for illuminating stereopticon pictures. That in most general use, is an electric lamp with specially designed filament arranged at right angles. This gives a strong, even white light. These lamps can also be used with a battery of dry cells, and are well adapted to schools and halls in rural communities, where electric wiring may not be available. Acetylene gas (see ACETY-LENE) and the oxyhydrogen limelight are also in use, but they have been virtually replaced by the electric light, because of its greater con-

venience and reliability.

The Screen for showing the pictures should have a plain, white or beaded surface, perfectly flat and free from wrinkles, to reproduce the pictures clearly. Lecture rooms are usually fitted with a white wall which can be used for a screen. Heavy muslin, hemmed and bound with cord, so that it can be tightly stretched, makes a very satisfactory screen, instead of the more expensive readymade one. It can be made any size for home use, and is easily adjustable.

The Slides. The pictures generally used in stereopticons are photographs on glass, known as slides. The American standard slide is 4x3 1/4



MECHANISM OF THE STEREOPTICON

inches, the English slide 3½ inches square. They may or may not be colored by hand. Since the perfection of color photography, beautiful slides are made by that process [see Photography (Color Photography)]. Because the lens inverts the picture, the slide must be inverted in the lantern, to have the picture appear correctly upon the screen.

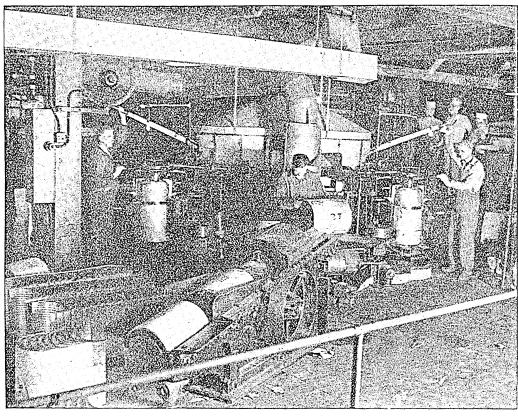
Dissolving Views. The dissolving-view effect is produced by a double lantern with the objectives so adjusted that each covers the same field on the screen, and by an attachment which gradually shuts off the light from one picture as it is turned on the other. In the hands of a skilful operator, very pleasing effects are produced.

STEREOSCOPE, an instrument through whose lenses photographs are transformed into pictures that are quite lifelike, with an effect of depth, distance, and solidity ordinarily possessed only by actual scenes and objects. The first stereoscope was invented in 1838 by Sir Charles Wheatstone in England, but the instrument which came into common use was an improved and simplified model which was developed by Sir David Brewster. Oliver Wendell Holmes, in the United

States, brought out still another model, based on the same principle as Brewster's machine, but much changed in appearance.

The principle of the stereoscope is comparatively simple. It must be remembered that the eyes of a human being may be compared to cameras; each eye reproduces a separate picture, and the brain combines them into one. Because the eyes are some distance apart, the pictures reproduced are not exactly alike. Each eye sees more of one side of a given object than does the other; together, the two eyes see farther around the sides of an object than can one eye alone. This is what gives objects the effect of standing out from their backgrounds. In the stereoscope, the eyes see, through lenses, two separate photographs, exactly alike, but differing to just the degree that the actual scenes would have differed when seen by the eye. These two photographs, which are placed in a rack and arranged so that each eye sees only one, are combined by the brain into one picture, which gives the lifelike effect.

In taking stereoscopic pictures, one camera with two lenses is commonly used, although two separate cameras would, of course, serve the same purpose. Theoretically, the lenses



A STEREOTYPING OUTFIT

The plates are made inside the round structure in the center. One pull of the lever completes the cast. The curved plates are then inspected, and later arrive at the stack shown in the left foreground, ready to be conveyed to the pressroom.

should be placed exactly as far apart as are the human eyes, but in practice it is found more satisfactory to increase the distance, thereby securing an effect of greater depth and distance.

Large library collections of stereographs are still sold to homes for travel and educational use. Stereographs of geographical and scientific subjects are sold to schools.

Eye specialists use the stereoscope for diagnostic and remedial use. Schools and industries, likewise, use survey stereoscopic outfits for discovering anomalies in vision.

STEREOTYPING. A stereotype is a plate made from type metal and used in printing. The process of making such a plate is known as stereotyping. The type is set and locked into forms. The face of the type is then brushed over with a brush containing a small quantity of oil. A pulp consisting of a mixture of clay and papier-mâché is then pressed down on the forms, so that a perfect impression of the face of each piece of type is made in the pulp. Next, the form is placed in a chamber and baked until the pulp is dry and hard, when it is lifted from the type. This mold, or matrix,

as it is called, is then ready for the stereotype plate, which is made by placing the matrix in a box face up, and pouring melted type metal over it. This hardens at once, forming a solid plate of type metal, and from this the page is printed. Plaster of Paris or clay may be used for the matrix, but papier-mâché is in general use.

Plates for use on small presses are flat, but those used on the rotary presses on which daily papers are printed are in the form of a half cylinder (see Printing Press). Stereotype plates are inexpensive and can be quickly made, the time required being about fifteen minutes. They are specially adapted to newspaper work. A number of plates can be made from the same matrix, and in all large cities there are firms that make a specialty of supplying country newspapers with a part of their subject matter in this way (see Newspaper). The use of the stereotype is now limited to printing newspapers and the cheapest editions of books. For work of a higher grade, the stereotype has been replaced by the electrotype. See Elec-TROTYPING.

STERLET, stur' let. See STURGEON.

STERNE, sturn, LAURENCE (1713-1768), an English author who had a distinct part in the development of the novel as a form of literature. He was born at Clonmel, Ireland, and as his father was an officer in the army, the boy's early years were spent in traveling from place to place with the regiment. In 1736 he was graduated from Cambridge, and two years later was ordained and given a living in Yorkshire. There he lived for twenty years, performing the duties of a country clergyman and delighting in the works of the old humorists and romancers. With the publication of the first two volumes of Tristram Shandy, in 1759, his seclusion ended, for at once the book became very popular, and the author was much in demand in London society. Seven other volumes of the work appeared within the next eight years, and Sterne's popularity increased. A journey on the Continent in 1765 resulted in A Sentimental Journey through France and Italy, which became the book of the moment in England, France, and Germany. Sterne lived but a month after the publication, in 1768, of what were to have been only the first two volumes.

Estimate of His Work. These two works, the author's only ones except volumes of sermons and some letters, have the fault of the time in which they were written, which did not demand delicacy in its writers. The sentimentality, too, seems obvious and overdone to a present-day reader; but the merits of the books are no less positive than their faults. Humor pervades the pages, and the easy, rambling style fits excellently the content. More important than all else, Sterne was a real creator of character, and some of the figures from his writings, notably Uncle Toby, from *Tristram Shandy*, will live as long as English is read.

STETHOSCOPE, steth' o skohp, a device used by physicians in examining the heart and Tests are made by listening to the sounds of these organs, as irregularities indicate certain diseases [see HEART (Sounds of the The simplest type of this instrument is a wooden tube about a foot long, hollow through the center and widening out at one end into a bell-shaped flange, which is placed against the chest. The other end is provided with an earpiece. A later device is equipped with two earpieces, joined to the chestpiece by rubber tubes. An instrument on the same order, but much more delicate, is known as a phonendoscope. It is a shallow, metal cup having attached to it two rubber ear tubes and a small rod ending in a button, the latter being placed against the chest. When the sounds must be determined with great exactness, this instrument is considered preferable to the stethoscope, as it magnifies

STETTIN, shtet een'. See GERMANY (Principal Cities).

STEUBEN, stu' ben (in German, shtoi' ben), FREDERICK WILLIAM AUGUSTUS, Baro I von (1730-1794), a brave German soldier who sailed to America, during the Revolutionary War, to aid the colonies. He was a veteran of two European wars, with a thorough knowledge of military tactics, and Washington made good use of him, sending him to Valley Forge

immediately to drill the raw colonial troops and establish an efficient military régime. As soon as he had the troops in one section trained, he was transferred elsewhere to "collect, organize, and discipline" more recruits. After the war, he spent the rest of his life in the United States. New York, Virginia, Pennsylvania, and New Jersey gave him grants of land for his services, and Congress voted him a goldhilted sword and a pension of \$2,400.



BARON STEUBEN

Von Steuben spent the last years of his life in a log cabin near Utica, N. Y., and in 1914 a monument erected to his memory was unveiled at Utica.

STEUBENVILLE, OHIO. See OHIO (back of map).

STEVENS, ALFRED. See Sculpture (England).

STEVENS, THADDEUS (1792-1868), an eloquent leader in the American Congress in the

period of slavery agitation, one of the most aggressive of the antislavery group. He was born at Danville, Vt., was graduated at Dartmouth College in 1814, and for a time taught school at York, Pa. Later, he studied law and began practice in Gettysburg. He served in the state legislature, and in 1848 and again in 1850 was elected to Congress, where he was a strong opponent of the fugitive slave laws,



THADDEUS STEVENS

the Kansas-Nebraska Bill, and all other measures favorable to Southern interests. In 1858 he was again elected to Congress, becoming the

acknowledged leader of the House and chairman of the Ways and Means Committee. He was bitterly hostile to the seceding states, and was a pronounced advocate of emancipation and the enfranchisement of the negro. In 1868, in a speech in Congress, he proposed the impeachment of President Johnson, and was one of the committee named to prepare the articles of impeachment.

Related Subjects. The reader is referred in these volumes to the following articles:

Emancipation Proclamation Fugitive Slave Laws

Impeachment Kansas-Nebraska Bill

STEVENS INSTITUTE OF TECHNOL-

OGY. See New Jersey (Education). STEVENSON, ADLAI EWING (1835-1914). an American statesman, Vice-President of the United States during Cleveland's second He was born in Christian administration. County, Ky., and was educated at Centre

College, in the same He was adstate. mitted to the bar in 1857, and began practice in Illinois. Having become active in the state Democratic party, he was elected to Congress in 1874. After the first election of Cleveland (1884), Stevenson was appointed First Assistant Postmaster-General, and in 1892 was elected Vice-President of the United States on the ticket with Cleveland.



ADLAI E. STEVENSON

On the expiration of his term, Stevenson was appointed a member of the American commission on the adoption of international bimetallism. He was again a nominee for the Vice-Presidency in 1900, on the ticket with William J. Bryan, but failed of election. In 1908 he was the Democratic nominee for governor of Illinois, but was defeated by Deneen. His chief published work was a book of political reminiscences.

STEVENSON, ROBERT (1772-1850), a Scottish engineer who built the Bell Rock lighthouse, overcoming what would almost appear insurmountable difficulties. He was born at As engineer and superintendent of Scottish lighthouses, he earnestly devoted himself to the task of rendering navigation He erected twenty-three lightmore safe. houses on the coasts of Great Britain, and was the inventor of the flash, or intermittent. light now universally adopted. On one of his tours of inspection as chief engineer, Stevenson was accompanied by Sir Walter Scott, who described the famous Bell Rock lighthouse in

his diary. In addition to his great work in behalf of safe navigation, Stevenson was widely consulted on the construction of roads, bridges, harbors, canals, and railways. died in Edinburgh. His son Thomas was the father of Robert Louis Stevenson, poet and novelist.

STEVENSON, ROBERT LOUIS [properly, ROBERT LEWIS BALFOUR] (1850-1894), a Scottish essayist, poet, and writer of fiction, born in Edinburgh, November 13, 1850, of a well-to-do family. His father was a civil

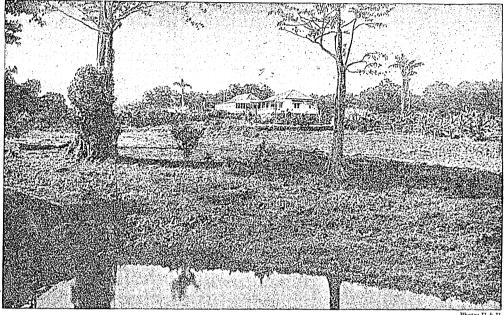
engineer, and the son showed much interest in that profession, which he was not robust enough to adopt. He studied at the University of Edinburgh, though his work was constantly interrupted by ill health, received a training in law, and was called to the bar at Edinburgh, in 1875. However, he turned from law to literature, and in 1878 published An Inland Voyage, in which is ROBERT LOUIS STEVENSON



described a canoeing journey in France and Belgium. recognized at once the charm of the young writer's style, but the public gave the graceful sketch little attention. In the following year, he published *Travels with a Donkey*, the material for which had been furnished by a trip through Southern France.

His Marriage. In 1876 Stevenson had met Mrs. Osbourne, the lady who afterward became his wife, and in 1879 he learned that she was ill in California. Deeply alarmed, he set out at once on the trip across the Atlantic. travel was expensive and his means were small, he went as a steerage passenger, and crossed the Continent on an immigrant train; and of these experiences, he made use in The Amateur Emigrant and Across the Plains. Arrived in San Francisco, he married Mrs. Osbourne, and, after some months spent in a desolate mining camp, returned with her and her son Lloyd to Scotland. His health, always far from robust, had suffered severely from the strain of his journey and his anxiety, and the years following his marriage were wandering ones, spent in search of strength.

Sought Far for Health. In 1888, still in search of health, Stevenson went with his family to Samoa, in the South Seas, where he remained until his death. His home, at the foot of Mount Vaea, he christened Vailima, and his work in superintending the building and the improvement of it was a delight to him.



THE SAMOAN HOME OF STEVENSON

Photo: U & U

THE PROPERTY OF THE PROPERTY O

The building is on the island of Upolu, about two miles from the sea. It is now occupied by the governor of the British Samoan Islands.

He acquired great influence with the natives, and took an active interest in their politics, attending councils, where he sat in state. He died December 3, 1894, of apoplexy, and the next day sixty natives carried his body to the summit of Mount Vaea, where he was buried.

His Great Work. In spite of the ill health that would have daunted a less courageous man, and the unfavorable conditions made unavoidable by his constant traveling, Stevenson produced between 1880 and 1888 two collections of delightful essays, Virginibus Puerisque and Familiar Studies of Men and Books; a volume of fanciful and entertaining stories, the New Arabian Nights; the very popular Treasure Island; Prince Otto, a pleasing romance; Dr. Jekyll and Mr. Hyde; Kidnapped, an excellent and widely read story of Scottish life; and two collections of poems, Underwoods and A Child's Garden of Verses, the latter of which reveals a remarkably sympathetic understanding of child life. These little poems seem not merely poems to a child or for a child, but by a child; and they show in delightful fashion what must have been the pleasures of Stevenson's lonely childhood.

The most notable of his productions during the Samoan period were The Master of Ballantrae, another story of Scottish life; David Balfour, a sequel to Kidnapped; and the uncompleted romances St. Ives and Weir of Hermiston, this latter regarded by many critics as Stevenson's greatest work.

His Place in Literature. Stevenson is one of the most fascinating personalities in the history of English literature, largely because of the courage which helped him to work diligently, uncomplainingly, and even cheerfully, in the face of great difficulties. Those who knew him personally found it hard to judge fairly of the writer, because of the charm which the man exerted. He ranks high, however, by reason of his

artistic, carefully wrought style, lucid and harmonious, and his extraordinary power as a storyteller who never forgot the importance of sustaining



Photo: O R O C

A MEMORIAL TO STEVENSON
A sculpture by Saint Gaudens, depicting the last days of the writer. It may be seen in the Church of Saint Giles, in Edinburgh.

interest in the narrative itself. He was, too, a master of description as well as of plot and dramatic incident, possessing an uncanny ability to vitalize whatever he presented and to create the magic spell of romance whenever, as was usually the case, he wished to do so. His Treasure Island, with its unfailing fascination for young and old, did much to usher in a period of romantic fiction in England and America following one in which realism had predominated. Portraying pirates and the quest of lost treasure as seen through the eyes of a typical boy, this book of high adventure is a classic of its kind. In all his work, indeed, Stevenson was an artist

to his finger-tips; and despite a lack of subtlety both in his philosophical content and in his depiction of character, he is assured of a permanent place of distinction among the authors of the Victorian Age. As a writer of romantic fiction, he is preferred by many to Sir Walter Scott. See EPITAPH.

STEWART, CORA WILSON. See Moon-LIGHT SCHOOLS.

STEWART RIVER. See YUKON RIVER.

STERE, steer. See METRIC SYSTEM (The Unit of Volume).

STEROPE, stehr' o pe, one of the Pleiades (which see).

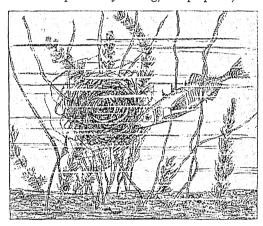
STHENO. sthe' no, one of the sisters of Medusa (which see).

STIBNITE, stib' nite. See Antimony.

STICK, a term in printing. See PRINTING (The Process).

STICK BUTTON. See BURDOCK.

STICKLEBACK, stik' 'l bak, a name applied to a family of small fishes of the northern hemisphere, so called because some of their fins are replaced by strong, sharp spines, the



THREE-SPINED STICKLEBACK AND ITS NEST

number of which is important in their classification. Instead of having scales, the body usually possesses a series of hard plates. There are both fresh-water and ocean species, the former attaining a length of from two to four inches, and the latter, of not more than seven. These fish have the peculiar habit of building muff-shaped nests of sticks and roots for receiving the spawn. The male carefully guards the spawn, and he also watches over the young for several days after the eggs are hatched. Sticklebacks feed voraciously on the young fry of other fishes.

Scientific Name. Sticklebacks comprise about a dozen species of the family Gasterosteidae. The threespined stickleback is Gasterosteus aculeatus.

STICKSEED, a tall, hairy-stemmed weed of the borage family, so named because its fruit, a small, dry nut, has rows of sharp bristles that stick to the clothing of people and to the fur or hair of animals. The plant grows in dry soil quite generally throughout North America. from the Mexican border northward. It has slender branches, gray-green leaves, and small blue, white, or lavender flowers. The stickseed is a persistent weed, and can be eradicated only by patient digging and cultivation.

Scientific Name. The botanical name of the stickseed is Lappula virginiana; it belongs to the family Boraginaceae.

STIGMA, in botany. See Flowers (The Parts of a Flower).

STIKINE, stih keen', RIVER, a Canadian stream, the chief waterway from the Pacific Ocean into the interior of Northern British Columbia. The Stikine flows into the Pacific Ocean through the narrow southern projection of Alaska, which shuts off a large part of British Columbia from the sea. It rises in Canada, on the west slope of the Cassiar Mountains, in British Columbia, and describes an irregular semicircle in its course, running first northward, then westward, and finally curving gradually to the south. The river is 335 miles long, and drains a basin of approximately 20,000 square miles. In summer there is steamer service on the river as far as Telegraph Creek, which is about 170 miles from its mouth.

STILE. See SUNDIAL.

STILL. See DISTILLATION.

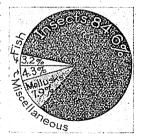
STILL, Dr. Andrew Taylor (1828-1917), the founder of osteopathy (which see).

STILLWATER, MINN. See MINNESOTA

(back of map).

STILT, a wading bird having long, slender legs which give it the odd appearance of walking on stilts. The stilts are related to the avocets, and are found in both the eastern and the western hemispheres. The black-necked

stilt, the only American species, is a handsomely marked bird about fifteen inches long, with white under parts, black upper parts, and bright-red legs. It builds its nest by lining a slight depression in the ground with grasses. The eggs are three or four in number, and are of

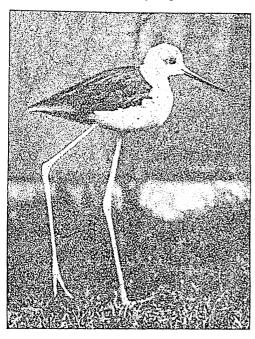


FOOD OF THE STILTS

an olive or buffy color, thickly spotted with chocolate tones. The bird frequents shallow ponds in fresh and salt marshes, and feeds on water insects and other aquatic forms. It is found in Western and Southern United States and southward. See illustration, page 6835. D.L.

Scientific Name. The stilts belong to the family Recurvirostridae. The black-necked stilt is Himanto pus mexicanus.

STILTS. Every one is familiar with the long walking sticks with foot rests, used by boys in their play, which enable them to cover the ground with very long steps. It is inter-



BLACK-WINGED STILT
This species is not found in America, but is seen in the British Isles. (See page 6834.)

esting to know that in some sections of Europe, particularly in Belgium and France, the peasants use stilts regularly when the lands are flooded. These practical stilts are strapped securely about the leg below the knee, and the walker uses a long pole to help him maintain his balance.

STIMSON, HENRY LEWIS (1867-American lawyer, served in the cabinets of three presidents, under two Republican administrations and one Democratic. He was born in New York City, son of Lewis A. Stimson, a surgeon of distinction. Henry Lewis attended private school and Yale University, receiving his A.B. degree from the latter in 1888. following year, he obtained the M.A. degree at Harvard, and then entered the Harvard Law School. In 1891 he was admitted to the bar in New York, where he subsequently practiced his profession. He gained a reputation for ability, industry, and integrity, and for the fairness which he always showed in trying cases, having been described as "a living refutation of the notion that an attorney must be sharp, even crooked."

Stimson served as United States attorney for the southern district of New York from 1906 to 1909, and was Secretary of War in the Cabinet of President Taft, 1911-1913. During the World War, he served in France as lieutenant colonel of the 305th Field Artillery, and as colonel of the

31st Field Artillery.

In 1927 he went to Nicaragua as special representative of President Coolidge, to ascertain the causes of internal dissensions. He found that election frauds were the basis of the trouble, and recommended that the United States take steps to guarantee an honest election. The results were effective.

Stimson served as Governor General of the Philippines from 1927 to 1929, when he



Photo: Keystone

HENRY L. STIMSON

became Secretary of State for President Hoover. In that capacity he was identified with the movement for reduction of naval armaments. He returned to the practice of law in 1933 with the beginning of the Democratic administration. However, Stimson accepted the appointment of President Roosevelt in June, 1940, and became Secretary of War for the second time. He occupied this important position when the United States entered World War II. See also Hoover, Herbert C; World War II.

STINGAREE, sting a re'. See STING RAY. STING RAY, also STINGAREE, a ray whose most striking characteristic is a long, flexible tail with sharp spines on the back. These spines have cutting teeth along the edges. When irritated, the sting ray swings its tail upward and sideways, inflicting a most painful wound. The fish live on sandy or in warm, shallow parts of the ocean. They have a flattened, disclike body, and may reach a length of ten or twelve feet.

Classification. Sting rays belong to the family Dasyatidae. There are about fifty species. The common sting ray is Dasyatis centrura.

STINKHORN. See Mushrooms. STINKWEED. See STRAMONIUM.

STINKWEED. See STRAMONIUM. STINNES, stin' nes, Hugo (1870-1924), a German industrial dictator and financier. He became one of the world's richest men, largely through his business enterprises, but also as a result of the steady depreciation of German currency in the chaotic period following the World War. Through financial maneuvers, he prevented the stabilization of the mark, returning the money he had borrowed, in inflated paper. See the article Germany (Germany and the World War).

Born at Mülheim, Germany, Stinnes was the son and grandson of practical Ruhr shippers and coal merchants. Educated at a realschule (preparatory school which lays chief emphasis upon mathematics, science, and the modern languages, but includes Latin), he later entered an office for business training, and then a colliery for mining experience. In 1880 he took a course at the Academy of

Mines, Berlin.

When twenty-two, Stinnes established his own organization, and devoted the remainder of his life mainly to business. His genius lay in his ability to promote industrial and financial combinations, and he kept unceasingly at work, relentless and tyrannical in the perfecting of his schemes. His interests were first primarily concerned with coal and its mining, and with shipping, but the World War gave him an opportunity to enlarge the scope of his activities. He became owner and controller of mines, factories, steamship lines, railroads, newspapers, hotels, and theaters, extending his operations to foreign countries, as well as to Germany.

A man of simple tastes, he lived modestly and spent but little of his great wealth. In 1920 he was elected to the Reichstag, but his influence there was negligible. He did not understand people, and could not gauge public opinion. Only in the field of business was he supreme. In 1921 he supported a movement to create a sort of super-trust to control every great industry in Germany, and to regulate production, transportation, and the supply of German markets, as well as those of the entire world. Such a plan gave him an opportunity to exercise his organizing ability, but he died with his ambition unrealized. After his death, his son allowed the business to decline, and by 1925 reorganization of the business left only forty per cent of the stock in possession of the family.

STIRLING RANGE. See WESTERN AUS-TRALIA (Physical Features).

STOAT. See Ermine

STOCK, CAPITAL. What is known in the business world as *capital* is the money, lands, buildings, equipment, etc., employed in a commercial enterprise. If only two or three people are associated in such an enterprise, a partnership is likely to be formed; and the evidence of each partner's share in the business is contained in a partnership agreement. If, however, the business is large and the capital is a sum so great that many partners are required, an arrangement so simple is not possible. In such event, a corporation is formed, and the capital is divided into small sums called shares.

Each share may be in face (par) value any sum determined upon-\$10, \$25, \$50, \$100, or even more. The usual amount in great

enterprises is \$100. Since 1912 some states, notably New York, have permitted corporations to issue stock without par value. Each investor, when he puts money into the enterprise, receives a certificate from the company. This states that he is a stockholder to the extent of the number of shares named in the certificate; naturally, this paper is called a certificate of stock, or a stock certificate.

A certificate of stock does not specify what the owner pays for it. One share whose face value is \$100 may have cost just that sum; if so, it was bought at par. Just to the degree that the corporation is prosperous or is a losing concern, the stock sells at prices above or below par. Owners of stock in a corporation cannot be assessed for debts of the corporation. Failure of the business enterprise may render their stock worthless, but they cannot be made otherwise to suffer financially.

Dividends are sums distributed to stockholders from the profits of the enterprise. A dividend on stock may be compared to interest on a loan, except that the former is uncertain, while interest is a fixed sum. If stock pays six per cent in a certain year, the dividend is \$6 on each \$100 share; if some holders purchased their stock at 50 (one-half par value), the return on their investment is twelve per cent; if they paid 120 (one-fifth above par), the actual income from their stock is five per cent.

Every stockholder is a participant in the business, though he is not known as a partner. He has the right to vote for those men, also shareholders, who shall give of their time to the oversight of the enterprise. Such managers form the board of directors. This board is directly responsible to the investors for the conduct of affairs, and it is given the privilege of choosing the officers in whose hands responsibility of management rests. The officerspresident, vice-president, secretary, treasurer, etc.—are responsible to the board. In elections to the board of directors, each man's voting power is proportionate to the number of shares he owns. If one man owns fifty-one per cent of the stock, he can outvote all the other members combined and control elections; this is fair to all, as his investment is largest and he has most at stake. Any stockholder who objects to the exercise of this power need not retain his stock; he may dispose of it as soon as a buyer can be found.

Watered Stock. When a corporation announces an increase in the number of its shares or securities without having a corresponding increase in the assets of the company, its stock is said to be "watered." This action results in a fictitious showing as to the amount of capital employed, and the actual value of the

shares is "diluted."

Classification of Stock. A corporation usually issues two kinds of stock, common and

preferred, which carry with them specific rights and privileges, indicated on the stock certificate.

Common Stock is the designation given to stock which has no financial preference as to dividends; possession of such stock allows the holder to share in the profits whenever the directors see fit to declare dividends. The dividends may be large or small, depending upon the prosperity of the business and the judgment of the directors. Common stock is considered speculative, because the amount of income from the investment is not definitely stated.

Preferred Stock. This term denotes shares that bear a fixed rate of dividend which must be paid before any earnings may be declared on the common stock. Another special privilege of preferred stock is that the dividends may be cumulative or non-cumulative. In the case of cumulative preferred stock, if the dividends are not paid when due, they accumulate, and must be paid out of future profits before any dividends are paid on the common stock. In case of non-cumulative preferred stock, the dividend must be paid out of the earnings of each year. Preferred stock is bought for the investment, and does not have the speculative features of common stock.

Treasury Stock is capital stock which has been duly issued and sold, but which has reverted back into the hands of the corporation, either by purchase or donation. In some states, a corporation may not buy its own stock, for the very purpose of that type of organization is to have the stock owned by many. However, when corporations allow their employees to buy stock, or present them with shares in recognition of service, etc., they usually agree to buy back the stock, should the employee leave the company. This stock would become treasury stock, and would be The common stockholders held until sold. sometimes agree to donate a number of their shares to the corporation, to provide funds for a new development. Stock acquired in this way also becomes treasury stock.

Related Subjects. The reader is referred to the following articles in these volumes:

Commerce Partnership
Corporation Stock Exchange

STOCK, FREDERICK A. (1872-1942), a violinist, composer, and for many years, dean of American conductors. He was born at Jülich, Germany. His early musical studies were under the direction of his father, a bandmaster in the German army. Later, he entered the Cologne University, continuing with his musical training; after graduation, he took up seriously the study of theory and composition. In 1895 Stock removed to Chicago and joined the Chicago Orchestra as viola-player. Four

years later, he was appointed assistant to Theodore Thomas, then its director. Upon the death of Thomas, in 1905, Stock succeeded to the conductorship, a position in which he remained until his death. The organization, known then as the Theodore Thomas Orchestra, is now the Chicago Symphony Orchestra. After World War I, Stock became a naturalized American citizen, and in 1919 was decorated Chevalier of the Legion of Honor (France). He conducted many concerts outside of Chicago.

In harmonization and orchestration, Stock belonged to the latter-day German school. He wrote many works in the larger forms—overtures, symphonic poems, and symphonic variations, which have frequently been played in Chicago. Among his compositions are Symphony in C Minor, Psalmodic Rhapsody for chorus and orchestra, a tone poem for a large orchestra, a concerto for violin and orchestra, and two overtures, Festival March and Hymn to Liberty. His symphonic poem, Life, was composed in memory of Theodore Thomas. He was selected as general director of music for Chicago's Century of Progress International Exposition.

STOCKBRIDGE INDIANS. See Indians, American (Most Important Tribes: Mohican)

STOCK EXCHANGE, an association of men who buy and sell stocks and bonds of railroads and other industrial enterprises. The name is also applied to the building in which the association conducts its business. The same reasons which justify the existence of a board of trade may be applied to a stock exchange. When a man wishes to buy or sell shares of a certain stock, there should be some convenient place where the transaction may be made. Many years ago, in London, before regular stock exchanges existed, a man desiring to purchase or dispose of stocks went to a well-known coffeehouse (somewhat like a modern restaurant); he knew that brokers, well informed in such business, were in the habit of congregating there, and for a small commission one of them would act as his agent in the transaction. In 1801 these brokers organized a buying and selling association, and called themselves, appropriately, a stock exchange.

How Exchanges Became Stable. In the development of such a business, many alterations in policy were inevitable. The early exchanges executed commissions in connection with any kind of stock that existed; there was no discrimination between the shares of strong, conservative enterprises and those which were of doubtful value. Finding it to be against public policy to recognize questionable stock and give it official approval equally with that which had proved value, stock exchanges eventually began to limit the number of enterprises whose shares should be recognized. To-

day, a "listed" stock is one which is dealt in on the stock exchanges; so far as the exchanges are concerned, any stock they do not list as entitled to their recognition does not exist. Before a company's stock can be listed, its officials must satisfy the exchange that it has paid-up capital, that it is a legitimate enterprise, and that it is in good financial condition. The Securities and Exchange Commission administers the Securities Act of 1933 and the Securities Exchange Act of 1934, designed to regulate securities' issues, listings, and trading.

It will be noted at once that many stocks are quoted on the exchanges every day at prices which mark them as extremely undesirable, if not almost worthless. Such a condition did not exist when they were first admitted to the exchange lists; circumstances which possibly could not have been avoided may have lessened the earning power, and thus lowered the price people are willing to pay for shares. Prosperous times or more intelligent management may advance values, or suspicion may force them still lower, but, in justice to hundreds of innocent holders of stock, the shares remain listed, so that their market value may at all times be known.

If a company is able to pay four or five per cent on its capitalization per year, its stock sells on the exchanges at about its face value, or at par. If its earning power increases until it can pay eight or ten per cent a year, people are willing to pay more than face value; if the stock is purchased even at a premium, the investor will get a good income. So great is the earning power of some corporations that their stock is worth from \$500 to \$900 for every \$100 share, but should disaster overtake them, and little hope exist that prosperity would return again, those same shares might sell for \$10 each. During World War I, the Bethlehem Steel Company made excessive profits from the manufacture of war munitions; people were so anxious to purchase its stock that the price advanced for a time to \$575 per share.

In addition to the above-mentioned functions, stock exchanges deal in the bonds of corporations whose stock they list, although they have not always done so. For many years, the New York Stock Exchange limited its activities principally to railroad stocks and bonds and to the bonds of the United States Government.

All great daily papers, in their market reports, print quotations and sales of stocks and bonds. Young people will learn much of value if they consult these lists frequently. They serve somewhat as a business barometer. Soon, with the help of the news columns of the papers, one will be able to know why certain stocks are high and others are low.

Memberships. Because an exchange limits its membership practically to the number of men who can easily care for the business within its sphere of influence, memberships have become worth large sums of money. Their value depends in a large measure upon the prevailing state of business and the market level of securities. The price of a seat on the New York Exchange has varied from \$34,000 in 1914, during a period of national depression, to as high as \$625,000 in 1929. In other market centers, the prices range from \$1,500 to \$100,000.

No man can purchase a membership and thereby become entitled to the privileges of his exchange; he must be formally recommended and then elected. If a member dies, his membership becomes the property of his heirs, but such transfer does not carry membership rights. The new owner must be elected to a seat, or the membership must be sold and the purchaser must secure election. If, on a member's death, he is indebted to other members of his exchange, the proceeds of the sale of his seat must first be applied to the cancellation of debts; any sum remaining belongs to the beneficiary.

The "Curb." How are unlisted stocks and bonds marketed, and how are their prices known and regulated, if stock exchanges refuse to recognize them? There are scores of companies whose unlisted stocks are on the market, and there is an immense amount of trading in them, in spite of their highly speculative character.

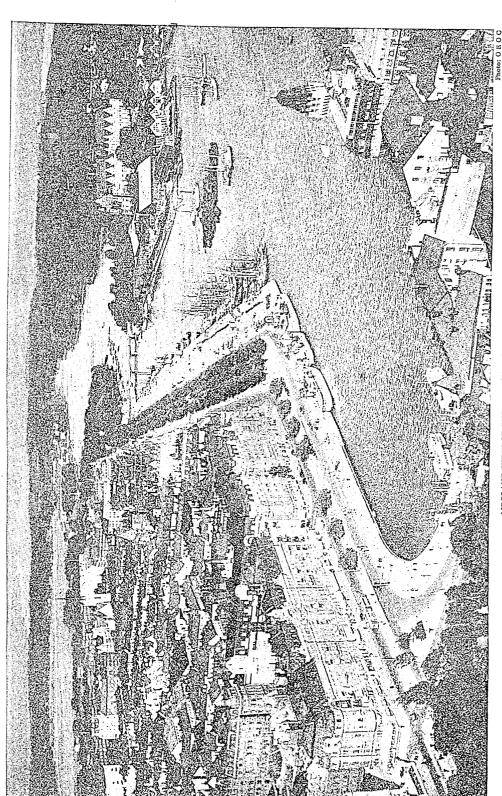
Such purchases and sales are made by what is known as *curb trading*. The name originated in the old custom of carrying on such trading in the streets or on the curbs. If brokers and customers were barred from the stock exchanges, they gathered outside the buildings or as near to them as possible. Sometimes there would be a wildly gesticulating crowd of a thousand men on the curb in a great city. At present there are curb exchanges in most of the cities having regular associations, but these curb exchanges operate inside of buildings, and the curb in New York is located in its own building. Daily newspapers report their transactions as fully as those of the regular exchanges.

Related Subjects. The following articles in these volumes should be read in connection with the above:

Board of Trade Capital
Bucketshop Corporation
Stock, Capital

STOCKHOLDER. See STOCK, CAPITAL.

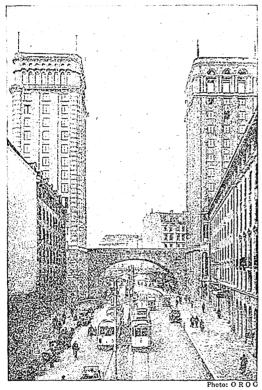
STOCKHOLM, the capital and metropolis of Sweden and the chief industrial center of that country. It is picturesquely situated on the shores of Lake Mälar, at the point where the lake is drained by a small stream into a channel of the Baltic Sea. A part of the city occupies a network of islands and peninsulas, and for this reason it is sometimes called "the Venice of the North." Yet there is nothing



AIRPLANE VIEW OF THE CITY OF STOCKHOLM

more and the state of the state

else about this interesting capital, with its characteristic northern scenery, its rocky hills, and virgin forests, to suggest the tranquil beauty of an Italian city. The old nucleus of Stockholm, called the *Staden*, which was founded by Birger Jarl about 1255, is built on an island in the stream; it is a place of nar-



IN STOCKHOLM

These office buildings are declared to be the tallest on the continent of Europe.

row, winding streets and quaint gabled houses, but the sections on the north and south shores of the mainland have broad, modern avenues, and many handsome squares, promenades, parks, and public buildings.

Stockholm is the chief intellectual center of Sweden. It possesses an excellent system of elementary schools, several higher technical institutions, the Royal Library, museums of fine arts, many scientific and historical academies, and an astronomical observatory. Near the observatory are the offices for the distribution of the Nobel Prizes (which see).

Stockholm manufactures beer, sugar, cotton goods, tobacco products, furniture, soap, foodstuffs, and other commodities. Shipbuilding is an industry of importance. Connected by canal with the Baltic Sea, Stockholm ranks next to Gothenburg as a shipping center. The harbor was recently enlarged, and in 1926 a new dock was completed, capable of accom-

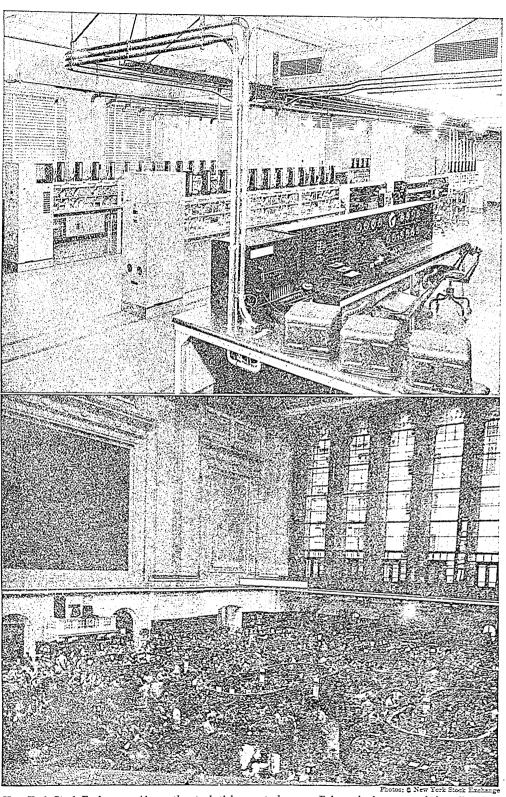
modating the largest ships. Population, 570,771 (1938 estimate).

STOCKS, an instrument of punishment for petty offenders, formerly used in Great Britain and other European countries; and in the American colonies, especially in New England, in the eighteenth century. The stocks consisted of a wooden structure, with a bench on which the culprit sat, with his legs outstretched and his ankles confined in holes between heavy boards, the upper one of which was movable and could be locked in place. Sometimes the stocks included a pillory (which see). Confinement in the stocks was usually for several hours at a time, and besides causing physical discomfort, it made the culprit an object of public ridicule. The use of the stocks in Britain dates back to Anglo-Saxon times. The Statute of Laborers, a law of 1350, provided this punishment for unruly artisans, but inebriates were the usual victims. At one time, practically every English village had its stocks, and specimens of the apparatus may still be seen in some places, occasionally with a whipping post attached (see illustration under CRIME). The stocks fell into disuse in England early in the nineteenth century. In the Southern states, the stocks were formerly used as a punishment for slaves; and in early New England, a common scold was sometimes condemned to suffer the obloquy of this uncomfortable exposure. See Pillory; Whipping POST; COLONIAL LIFE IN AMERICA.

STOCK TICKER, an electric machine that prints stock quotations on a paper ribbon. In popular language it is called the *ticker*, and the ribbon is the *tape*. The ticker operates on the principle of the telegraph. Records of the New York Stock Exchange show that it was first used at the Exchange on November 15, 1867. Prior to its appearance, information about prices was transmitted by mail or messenger—both very slow and unsatisfactory methods, in comparison with the swiftness of the telegraph.

There are 5,000 stock tickers in use in the United States. Of this number, 3,500 are employed to furnish the prices of the New York Stock Exchange, and 2,400 are maintained by the Western Union Telegraph Company, for the accommodation of other exchanges and to record the transactions of the curb market.

The use of the ticker may be shown by an example. Suppose that a customer in Detroit orders from his broker shares of a stock that can be bought only on the New York exchange. The Detroit broker wires the order to a firm in New York. That office telephones the order to its trader on the floor of the exchange. The latter goes at once to the trading post where that stock is being marketed, calls out his order, and buys the stock. As soon as the trade is completed, a clerk takes down the



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New York Stock Exchange. Above, the stock ticker control room. Below, the busy, crowded trading floor of the New York Stock Exchange during a market session. 6841

name of the stock, the number of shares, and the price. He sends this information by pneumatic tube to a central transmitting room where trades are recorded. At this point, there is a man with a machine which resembles a typewriter. The report is written by the operator, and in this process the characters are transmitted electrically to a control machine that prints all the transactions in the order of their reception. From this control machine the symbols are sent out to all tickers.

The report of this trade will appear on the ticker in the office of the Detroit broker a few minutes after the customer placed his orderprobably four or five minutes are sufficient to complete the entire transaction. From the standpoint of a simple purchase, this degree of speed is probably all that could be asked.

However, there is one phase of the ticker's work for which it has been far too slow. In the late twenties, the volume of stock-trading so increased at times that the ticker was unable to keep pace with it. On the days of the heaviest trading, when several millions of shares were dealt in, the ticker was sometimes an hour or two behind the market. At such times, the business of the exchange temporarily disappeared from view, and the "priceless news of

prices" could not be obtained.

To remedy this condition a new ticker was devised which has double the speed of the former machine. The ticker was developed in 1928 by engineers of the Teletype Corporation, co-operating with the New York Quotation Company and Western Union Telegraph Company. The installation, in 1930, of the necessary operating equipment required the expenditure of \$2,000,000 by the New York Stock Exchange, and a still larger amount of the Western Union. This huge outlay was fully justified by the importance of getting information about the market, with promptness and certainty, to the investors of the country.

The present highly developed form of ticker is able to print 150,000 characters a day. In an effort to increase the amount of information which it can communicate, changes have been made in the symbols of which quotations are made up. These changes were for the purpose of reducing the number of characters indicating a given stock. For example, United States Steel was formerly known as US. Now it is simply called X, one letter instead of two. Many such changes have been made, and have resulted in considerable saving of time, by increasing the stock ticker's capacity. See STOCK EXCHANGE; also TELEGRAPH (Printing Telegraph).

STOCKTON, CALIF., the county seat of San Joaquin County and one of the leading manufacturing cities of the state. It is situated at the head of tidewater navigation on the San Joaquin River, about forty-eight miles

southeast of Sacramento and eighty miles east of San Francisco. Lying at the junction of the San Joaquin and Sacramento valleys, Stockton is one of the largest grain, vegetable, and fruit markets of the West. Population,

54,714 (1940).

Stockton occupies a level site and is known as a city of beautiful homes and gardens. Over 1,000 miles of paved highways radiate from the city, leading to a vast recreational region, including Yosemite, Tahoe, Wawona, and Calaveras groves of Big Trees, and the goldmining region of '49 fame. Twenty-three public parks are located within the city.

United States Army reservations at Stockton include Stockton Field, an air corps training school; and the Port Stockton supply depot and

the mechanics training school.

Transportation. Nearly 1,000 miles of navigable waterways connect with Stockton including a ship channel which has been dredged to permit 90 per cent of the ocean-going vessels to dock at this port. The railroads serving the city are the Atchison, Topeka & Santa Fe, the Southern Pacific, and the Western Pacific. In addition, there are three interurban lines, as well as motorbus service between Stockton and San Francisco and various other points.

Industries. Among the important products of Stockton's varied industries are cans, flour, cereals, leather, window glass, paper products, wall board, motor boats, road-building machinery, bricks, radio apparatus, agricultural machinery, cedar-pencil slats, and canned fruits and vegetables. To the north of the city is a district, ten miles square, which is devoted to vineyards and orchards. The San Joaquin River delta produces immense crops of potatoes, corn, asparagus, and grains.

Institutions. The College of the Pacific occupies a site of seventy-four acres, and has carried out a building program costing approximately \$1,500,000. In the city, also, are Saint Mary's School, Saint Agnes Academy, Saint Joseph's Home for the Aged, and the Pacific and state hospitals. The new civic auditorium, with a seating capacity of 5,000, was built as a memorial to the soldiers of World War I.

Stockton is the oldest settlement History. in the San Joaquin Valley. Founded in 1844, it was first called Tuleberg, and later New Albany. In 1849 a town was laid out, and the present name was adopted in honor of Robert Field Stockton, who was instrumental in gaining possession of California for the United States, during the war with Mexico. Because of its strategic position, Stockton became an important outfitting post for the gold-seekers of '49. Stockton was made the county seat and chartered as a city in 1850. The citymanager form of government was adopted in

STOCKTON, Francis Richard (1834-1902), a popular American writer of humorous stories, called by a contemporary admirer a

"wonderful weaver of fancies" and-

"A King of the Kingdom of Laughter And a Prince, but never of Wails."

The stories of Frank Stockton, as he is usually called, are enjoyed for their whimsical humor, unusual characters and situations, and at-

tractive style. Their author spent his early life in his native city of Philadelphia. Although he showed literary ability by writing verses at the age of ten, and by contributions to his highschool paper, he became a wood engraver and designer after completing school. He began his professional literary work in 1866, when he became a reporter on the Philadelphia Morning Post. Later, he joined the staffs of the *Hearth* and Home and Scribner's Monthly of New York, and in 1873 became assistant editor of Saint Nicholas. Af-



FRANK R. STOCKTON His best-known short story The Lady or the Tiger This excellent specimen of the storyteller's art is famous for its unique ending—a two-way conclusion which leaves the reader guessing ter 1899 he lived at whether the lady or the Claymont, in the tiger came through the

Shenandoah Valley, near Charlestown, W. Va., an estate formerly owned by the Washingtons and planned by the first President. He died at Washington,

'Career as a Novelist. After seven years of editorial work, Stockton began to write independently. In 1879 his most popular story, Rudder Grange, appeared, and firmly established his fame among American humorists. Among other stories are The Lady or the Tiger? his best-known short tale, which has been translated into several other languages; The Christmas Wreck and Other Stories; The Casting Away of Mrs. Lecks and Mrs. Aleshine, and its sequel, The Dusantes; The Becman of Orn; The Hundredth Man; Pomona's Travels (a continuation of Rudder Grange); The Adventures of Captain Horn; Mrs. Cliff's Yacht; Afloat and Ashore; The Girl at Cobhurst; and Ting-a-Ling Stories, a collection of tales for children.

STOCKTON, RICHARD (1730-1781), an important aid to the colonies during the Revolutionary War. A statue of Stockton, by Henry Kirke Brown, is a gift of the state of New Jersey to Statuary Hall, Washington, D. C. Born near Princeton, N. J., he was a graduate of the College of New Jersey (Princeton), and was admitted to the bar in 1754. In 1774 he was judge of the Supreme Court of New Jersey. At first, Stockton advocated reconciliation between the colonies and Great Britain, but later actively opposed the British Ministry. As a member of Congress, in 1776, he was one of the signers of the Declaration of Independence. See STATUARY HALL.

STOCKYARDS. See Armour, Philip Dan-FORTH; CHICAGO (Commerce and Industry); MEAT AND MEAT PACKING.

STODDARD, RICHARD HENRY (1825-1903), an American poet, essayist, and critic, born at Hingham, Mass., the son of a sea captain.

While he was still a boy, the family moved to New York, and he attended a public school there, later studying law. After working for a time in a newspaper office, he learned the trade of a blacksmith, and then that of an iron-molder. at which he worked for several years. In 1849 he produced a volume of poems, Footprints, and from that time published frequently both prose and verse. RICHARD HENRY STODDARD



SAMULTANIA MATAKAN MATANIA MATANIA

From 1853 to 1870, Stoddard had a place in the New York customhouse; from 1880 until his death, he was literary editor of the Mail and Express, a New York evening paper.

His Writings. Delicacy and sincerity are the chief characteristics of his writings, which include Songs of Summer, The King's Bell, The Book of the East, and Under the Evening Lamp, besides biographies, juvenile books, and editions of the works of other poets.

STOICISM, sto' ih siz'm, belief in the doctrines of Zeno, who was called "the Stoic philosopher," because he gave his lectures in a public porch, called stoa in Greek.

Zeno founded his school of philosophy in the latter part of the fourth century B.C. Its teachings were lofty and severe. At a time when the followers of Epicurus were telling the people of Athens that pleasure is the chief end of existence, the Stoics taught virtue, for its own sake, as the highest good. Because it was a pantheistic philosophy, contending that all reality, though material, is animated by God or reason, with which the soul of man is identified, happiness to the Stoics meant living in harmony with the divine order, with each accepting his destiny uncomplainingly. It was thus a practical philosophy, its followers practicing self-control, courage, temperance, and justice, and repressing all emotion arising from pain or misfortune. One of their doctrines that has had a marked influence on the thought of the world, being embodied in many a modern political creed, was that every human being is part of the same "world soul"-a universal brotherhood that should dwarf all difference of rank and nationality. It was this principle, also, that helped to prepare the world for the acceptance of Christianity.

The Stoic philosophy made a strong appeal to the Romans. See Aurelius, Marcus; Epictetus; Epicurus; Philosophy; Seneca; Zeno.

STOKOWSKI, LEOPOLD (1882-), orchestra conductor. He was born in London,

tra conductor. He was born in London, England; educated at Queens College, Oxford; continued his musical studies in France and Germany. He came to America and from 1909 to 1912 conducted the Cincinnati Symphony Orchestra. From 1912 until he withdrew in 1936 to do research work in music, he con-



LEOPOLD STOKOWSKI

ducted the Philadelphia Symphony Orchestra. In 1940 he toured South America as conductor of the All-American Youth Orchestra.

STOLA, the outer garment of ancient Roman matrons. Gathered in at the waist by a girdle, it fell in folds to the ankles. It was often ornamented at the shoulder by a fibula. The palla, a loose mantle, was draped shawl-like over the stola. Divorced women were forbidden by law to wear a stola. See Tunic.

STOMACH, stum' uk, a dilation of the alimentary canal below the oesophagus. It is a somewhat J-shaped muscular sac, located in the upper left side of the abdominal cavity. It presents a body, with an enlarged upper end which connects with the oesophagus. The body is variable in shape, and is continuous with a constricted lower portion known as the pylorus, which leads into the small intestine.

When nearly empty, the stomach presents throughout a narrow, tubelike form. When filled with food, it may be distended to considerable limits. The average capacity of the stomach is one liter (a liter is 1.056 liquid quarts). The stomach also varies in form and position according to the general physique of the individual. Tall, thin people have long, narrow stomachs, while short, stocky people have stomachs that are shorter and wider. The position of the stomach varies in different individuals, and in the same individual according to physiological changes in condition.

The stomach plays an important part in digestion. Its functions are the following:

- (1) To reduce the food to a viscid, pulpy liquid.
- (2) To begin the digestion of proteins.
- (3) To supply hydrochloric acid, which is believed to assist in dissolving the food, to prevent bacterial action in the stomach, and to act as a stimulus to the secretion of the digestive juices in the small intestine. This latter function has been seriously questioned in work done by a number of physiologists.
- (4) To pass the food on to the intestines in comparatively small quantities, at short intervals.

The stomach accomplishes these functions in the following ways: The food is introduced into the stomach at its upper end, from the oesophagus. By means of the powerful muscles with which the stomach is supplied, rhyth-

mic contractions are set up which start at the upper end and pass in ringlike formation toward the lower end. This does two things: It propels the food toward the pyloric end of the stomach, and it also reduces the food to a pulpy mass. These contractions occur at regular intervals of about twenty seconds, and are known as peristaltic waves; when the stomach is empty, it is these contractions that first make us conscious of a sense of hunger. When the food reaches the pyloric end of the stomach, it is prevented from going farther by a sphincter. This sphincter opens only at certain intervals, when the food is ready the intestines. The time taken to empty the stomach varies with different individuals and according to the



to be passed on to coats of stomach, highly magthe intestines.

- (a) Duct of gastric gland(b) Mucous membrane
- (c) Muscular coat of mucous membrane
- (d) Submucous coat(e) Circular muscles(f) Longitudinal muscles

type of food eaten. Liquids require little preparation by the stomach, so that the sphincter lets them through almost immediately after ingestion. On a mixed diet, most stomachs are empty in three hours.

When the food is in the stomach, in addition to being mechanically reduced to pulp, it is acted upon by the gastric juice. This juice is a whitish fluid secreted by glands in the stomach, and contains water, salts, mucus, hydrochloric acid, and two ferments—pepsin and rennin. So far as is known, rennin acts only on milk, while pepsin begins the digestion of

the proteins. Carbohydrates and fats are not acted upon in the stomach. Probably the main function of the stomach is in its mechanical action on the food, and the important digestive processes take place farther down in the alimentary tract.

Abuse of the stomach is the source of many ills to which the human race is subject. K.A.E.

Related Subjects. The reader is referred to:

Abdomen Digestion Pepsin
Alimentary Canal Intestine Peptones

STOMATA, sto' mah tah. See Leaves. STONE. See Rock; Building Stone; Roads and Streets.

STONE, FRED ANDREW (1873-American comedian and eccentric dancer who has appeared in colorful musical shows beloved by children as well as adults. His stage experience began when, at the age of eleven, he gave a single performance in Topeka, Kan. Between 1886 and 1894, he was a member of a traveling circus, and later played Topsy in Uncle Tom's Cabin. In 1894 he met David Montgomery, with whom he formed a "team" that was very popular in vaudeville. The two continued their association in musical comedy until Montgomery's death. In 1903, as the Scarecrow in the Wizard of Oz, Stone was received with enthusiasm by the critics. In 1928, Stone was injured in an airplane crash, but in 1929 he resumed his theatrical career in the musical production Ripples.

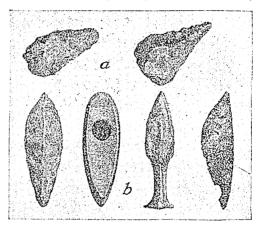
STONE, HARLAN FISKE (1872-), American jurist, served as an Associate Justice of the United States Supreme Court from 1925 until his appointment as Chief Justice in June, 1941. He was born at Chesterfield, N. H., and educated at Amherst, Yale, and the Columbia law school. For six years (1899-1905) he taught law at Columbia University. There followed an interim of private practice; then thirteen years (1910-1923) as dean at Columbia. He was appointed Attorney General in 1924.

Although a successful Wall Street corporation lawyer with various conservative leanings, Stone proved to be a man of liberal views during his tenure as Associate Justice. In his own words, "We are coming to realize that the law is not an end but a means to an end."

STONE, NICHOLAS. See SCULPTURE (England).

STONE AGE, a period in the history of a people when they know nothing of metals, but use weapons and instruments made of stone, wood, bone, and horn. The term is descriptive of a stage in the development of the cultural attainments of a people, and represents a degree of civilization. Perhaps a few people in remote regions are still in their Stone Age—savages of the South Seas, Eskimos of the Polar regions—who use only the implements of the era long

passed by enlightened people. In Europe, men emerged from the Stone Age many thousands of years ago, when animals now extinct roamed the forests—the mammoth, the woolly rhinoceros, the cave lion, and the cave bear. In Asia and in Africa, the Stone Age came still earlier. All that is known of these people of other ages is learned from the relics that are found in caves and river gravel and burial mounds. There are axes and axhammers, knives, daggers, spear tips and arrowheads,

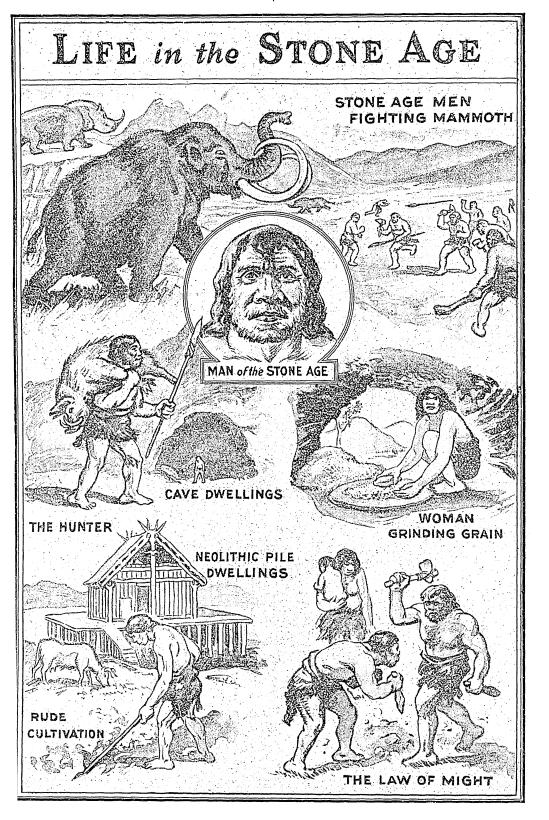


FLINT AND STONE IMPLEMENTS

These were among man's earliest weapons. (a) Specimens of the Paleolithic period; (b) of the Neolithic period.

saws, and chisels, the earliest ones of chipped flint, the later ones of polished stone. Carved bits of bone and horn are found with them, and sometimes very crude pottery. These races made striking paintings of men and animals on the walls of their caves. In the latter part of the Stone Age, the people lived in skin wigwams, herded cattle, sheep, and goats, and cultivated the land as primitive farmers. See page 6846.

Scientists divide the Stone Age into two divisions—the Paleolithic (Old Stone Age) and the Neolithic (New Stone Age). The former corresponds roughly to the geologic past, and is sometimes called "the age of chipped stone." The Neolithic is the period of highly finished stone implements. Generally speaking, the beginning of the Stone Age is estimated at about 100000 B.C., and the end at 4000 B.C., when the use of metals had its rise in Egypt and Chaldea. The best-known types of humanity living in the Paleolithic period were the Neanderthal men and the Crô-Magnons. The former were a squat, powerful, brutish, low-browed race. The Crô-Magnons, who were over six feet tall on the average, had a remarkably large cranial capacity; their brains were somewhat bigger than those of modern Europeans. See Megalithic Monuments. c.w.





Literary Reference. Stanley Waterloo wrote a fascinating book called *The Story of Ab*, in which he described the life of a boy in the Stone Age.

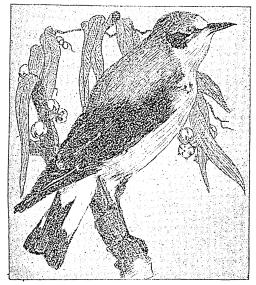
Related Subjects. In this connection, the following articles in these volumes provide helpful material:

Age Bronze Age Geology

Human Epoch Iron Age Neanderthal Man

STONEBUCK. See STEINBOK.

STONECHAT, a small European bird of the thrush family, which takes its name from its peculiar note, a sound like that of two pebbles struck together. It is restless and active, and is usually found in open, grassy lo-



THE STONECHAT

cations, where it builds its nest on the ground, under a tuft of grass. The eggs are four to six in number, of a greenish-blue color, faintly spotted. The bird migrates in winter to Africa. It feeds on insect larvae, worms, beetles, and seeds. The stonechat is the blue titmouse of Ireland.

Scientific Name. The scientific name of the stonechat is *Pratincola rubicola*. It belongs to the family *Turdidae*.

STONE FLY, an aquatic insect, so named because the larvae live in the water attached to the under side of stones. The stone fly is carnivorous, for it subsists largely on the nymphs of May flies.

STONEHENGE, stone' henj, an impressive prehistoric monument, consisting of a group of huge, rough-hewn stones. Stonehenge is on Salisbury Plain, in Wiltshire, England, a mile and a half from Amesbury. It has been called "the Riddle of Salisbury Plain," for archaeologists have been unable to determine its date of construction or the use to which it

was originally put. It is believed, however, that it was the work of a race of sun-worshipers who lived in Britain as early as 1800 B.C.

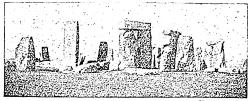


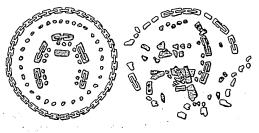
Photo: OROC

STONEHENGE BEFORE ITS RESTORATION

Later, it is supposed, the Druids (which see) used the structure as a temple.

Originally, the work was probably arranged according to the following plan: The entire monument was surrounded by a circular earthwork, 300 feet in diameter. Within were two concentric circles of standing stones, the outer circle, which consisted of thirty upright and thirty horizontal stones, being 105 feet in diameter. Forty smaller stones made up the Within these circles were two inner circle. other sets of stones, one row within the other and each forming a horseshoe with the opening toward the northeast. Near the central curve of the inner horseshoe, and across a northeastsouthwest axis line, was the so-called altar stone, a flat block of blue marble fifteen feet in length. The arrangement of this stone, and of two others placed on a line with it, seems to indicate that they were used to determine the time of the summer solstice. It is on this evidence that authorities base their theory that Stonehenge was connected with the worship of the sun.

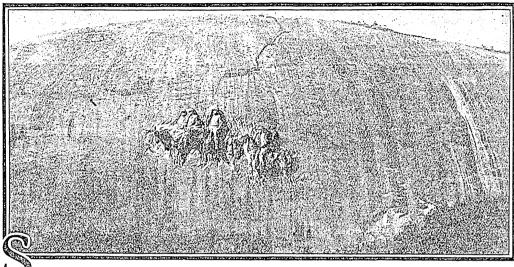
For centuries this great monument was left to fall into ruins, and many of the huge stones were carried away to make bridges and milldams. In 1922, however, the British government began the restoration of Stonehenge, replacing missing stones, and to-day the monument stands as a remarkably preserved relic



... PLAN OF STONEHENGE

At the left, as the stones originally stood; at right, as they appeared when strewn about by the hand of time.

of an older civilization. It is cared for by the government, and a small fee is charged the public for admittance.



TONE MOUNTAIN, a huge, rounded mass of light gray, practically unblemished granite, about sixteen miles northeast of Atlanta, Ga. It is 867 feet high at its highest point, and 5,000 feet long. This mound is to

be transformed into a permanent memorial of the heroic struggle of the South during the War of Secession, by means of the most colossal piece of sculpturing ever undertaken.

Work on this monument was begun by Gutzon Borglum, who was succeeded in 1925 by H. Augustus Lukeman. Lukeman made entirely new designs for a group of equestrian figures. The work was aban-doned in 1928, due to lack of funds. In 1931 the Georgia legislature enacted a law authorizing the governor to appoint a State Memorial and

Monument Commission. In 1940 the governor appointed such a commission to replace the one previously appointed, whose term had expired.

The actual sculpturing is the task of the drillers rather than of the artist. The sculp-

tor's duties, in addition to supervision, consist of preparing master models. These designs are transferred to the mountain by mathematical measurements which plot the course of every curve, holes being drilled at intervals to trace

_ the pattern.

Equestrian figures of General Lee, General Jackson, and Jefferson Davis, posed ready to review the marching army, will make up the first group. General Lee's head was partially completed when Lukeman took over the work. An idea of the gigantic size of the figure may be gained from the fact that, at the unveiling of Lee's head, thirty people sat down on the shoulder of the statue. rectly behind the three leaders will be two colorbearers and four other generals, chosen by the historical societies of



AT WORK ON THE MEMORIAL

Cables hold the artisans in their positions on the side of the mountain. All of the hundreds of figures will be cut in the rock by pneumatic drills.

the South. The third group will show the marching army, so designed as to give the illusion of thousands of marching soldiers. Directly beneath the sculpture, at the ground level, will appear thirteen Ionic columns, one for each of the Confederate

States, forming an entrance to the huge Memorial Hall that is to be hollowed out of the rock, and dedicated to the women of the South. The scheme includes also a tomb of an Unknown Soldier, and a museum.

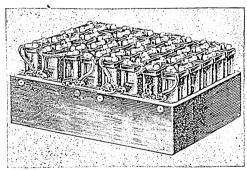
The financial part of the undertaking was formerly in charge of the Stone Mountain Confederate Memorial Association, but this organization has in recent years become inactive. The State Memorial and Monument Commission has full authority to carry on the project, including financial activity. Congress authorized the minting of 5,000,000 Stone Mountain half dollars, on June 18, 1923, but only 2,500,000 were actually minted and issued. It has been estimated that approximately 1,500,000 of these half dollars were sold.

STONE OF DESTINY. See CORONATION (Coronation Chair).

STONES, PRECIOUS. See GEMS.

STONEWALL JACKSON. See JACKSON, THOMAS JONATHAN.

STONEWARE. See POTTERY (Varieties). STORAGE BATTERY. The storage battery can be understood by anyone who will perform the following simple experiment: Connect four dry cells in series. With two wires connect two strips of lead to the terminals of the battery of dry cells. The lead strips should be at least one inch by four inches. Place the lead strips in a solution composed of one part of strong sulphuric acid to twenty parts of water. Bubbles of hydrogen will rise from one of the lead strips, and a red coating will appéar on the other. After a few minutes, disconnect the dry cells; then join the lead strips with a wire, and connect them to an electric bell. The bell will ring. A storage

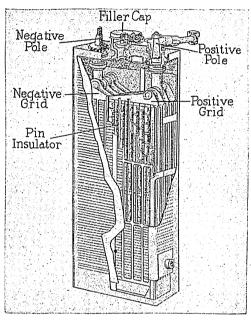


HIGH-POTENTIAL STORAGE BATTERY
Small glass containing cells are permanently connected and assembled in hardwood trays.

battery has been formed. (Strictly speaking, a storage cell has been formed, but it is now customary to use the term battery for one or several cells.) The current from the dry cells has produced a chemical change on the lead plates, one of the plates becoming coated with an oxide of lead (lead peroxide), the other remaining pure lead.

These two plates, one lead, the other lead peroxide, with the sulphuric acid, form a battery which acts like any other electric battery. The acid acts more rapidly on the oxide of lead than it does on the lead. When the two

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DETAILS OF A STORAGE BATTERY

plates are connected by an electrical conductor this chemical action produces an electric current. It is *chemical energy* which is stored in a storage battery. When the proper electrical connections are made, this chemical energy is transformed into *electrical energy*. When the battery is run down, it is in the same condition as at first; that is, in the simple storage cell described above, the lead peroxide has been reduced to lead, and both plates are again lead. The storage battery may be charged and discharged as often as desired.

The difference between a storage battery and other electric batteries is that, in all other batteries, new solution and new zinc plates must be supplied when the battery is run down, while in the storage battery, the plates and the solution are renewed by passing an electric current through the battery from some other source, and in a reverse direction from that in which the current flows out of the battery.

The plates of commercial storage cells are usually in the form of grids. The apertures in the positive plate are filled with lead peroxide, and those of the negative plate with porous lead. When the cell is discharged, both plates consist of monoxide of lead.

In the Edison storage battery, the plates are formed of grids of sheet steel. The grids of the plates which form the positive electrode are filled with nickel hydroxide; the plates forming the negative electrode are filled with an oxide of iron (ferrous oxide) mixed with graphite. The liquid is a solution of caustic potash (potassium hydroxide). The merit of the Edison battery lies in the fact that it will stand, without injury, severe usage which would destroy a lead battery. It has greater capacity in ampere hours in proportion to weight than a lead battery. The voltage

of the Edison battery is about 1.1 volts for each cell, while that of a lead battery is two volts.

Storage batteries are used on automobiles driven by gas, for ignition, starting, and lighting, and they are the sole source of power on electrically driven In steamcars. railway systems, storage batteries are used for lighting: they carry the load while the car is at rest. Batteries of large capacity are used for stand-by service in central power stations, and in power stations for electric railroads, to relieve the generators at the peak of the service. Storage batteries supply the only power available for submarines while they are submerged. These batteries are also employed in connection with radio apparatus, telephone exchanges, fire-alarm sys-

tems, and laboratory work, and in private lighting plants not connected with power-station service. H.S.E.

Related Subjects. The reader is referred in these volumes to the following articles: Edison, Thomas A. Electricity

Electric Battery

Electricity Volt

STORK, a long-legged, strong-winged bird, of large size, finding its food in marshes and

swamps, but often nesting on roofs and chimneys, in close proximity to the dwellings of man. It feeds on eels, frogs and toads, reptiles, young birds, and small mammals. Storks are allied to herons and ibises. The best-known species is the *white stork*, found in summer throughout most of Europe and Central Asia, and migrating for the winter to Africa and Northern India. This stork has pure-white plumage, with black wing coverts

and quills, a red beak, and reddishpink legs and feet. The pair returns year after year to the same nest, building onto it until it is several feet in height. The three to five eggs are white. stork has no voice, and can only chatter by striking together the parts of its strong beak.

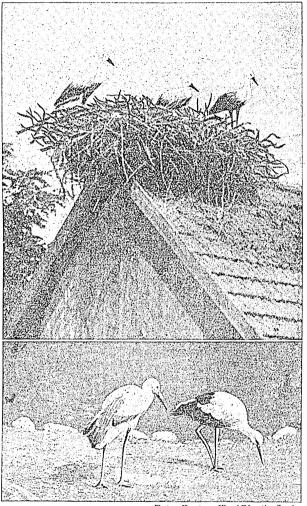
Other storks of the eastern hemisphere are the Japanese stork, the black stork, the white-necked stork, and the adjutant. In South America are found the maguari stork and the jabiru, a bird five feet high, occurring as far north as Texas.

Much folklore has grown up about the stork, and it is protected and venerated in many sections, especially in Germany and the Netherlands, not only for its usefulness in destroying insects, reptiles, etc., but also as a bird of good omen and the symbol of

plants not domestic affection. From its loving care for its ce. H.S.E. young has come the familiar legend that the stork brings the new baby into the home. See ADJUTANT; JABIRU.

Scientific Name. The stork family is Ciconiidae. The white stork is Ciconia alba.

STORM LAKE. See Iowa (Rivers and Lakes).



A stork nest on a housetop in Poland is considered an omen of

Photos: Keystone; Visual Education Service

EUROPEAN STORKS

STORMS, disturbances of the atmosphere. marked usually by strong winds, rain, snow, or hail, or by a combination of two or more of these. If the temperature of the air were everywhere equal, storms would be unknown. But the sun warms the air unevenly; its heating action is greatest at the equator and is least at the poles. Heated air expands, the upper layers flowing off into the surrounding regions, cooling as they go. This reduces the atmospheric pressure over the warm areas, and increases it elsewhere. Air on the lower levels is thus driven into the center of low pressure, and a rotary circulation on a vast scale is maintained by the action of the sun's heat and the pull of gravitation on the atmospheric envelope.

Storms are known as general and local. The former alone are described here. Such storms may cover a low-pressure area having a diameter of from 500 to 1,000 miles, but they are not often violent. They are accompanied by shifting winds and more or less rain or snow. Technically, they are known as cyclones, or cyclonic storms, but they must not be confused with the so-called cyclones of the Mississippi Valley, which are really tornadoes. Storms which occur in areas of high pressure, rather than of low pressure, are given the name anti-cyclonic storms.

Cyclonic storms of this nature have well-defined areas on nearly every continent. In North America they cover the great central region between the Rocky and the Appalachian mountains. They have an almost uniform progress from west to east, and it usually requires eight or ten days to complète a cycle; for this reason, storms and fair weather succeed each other at frequent intervals. This regularity of movement makes it possible for the Weather Bureau to foretell, with a good degree of accuracy, the approach of these storms from twenty-four to thirty-six hours in advance.

Thunderstorms are by far the most numerous of all. Not fewer than 45,000 of this variety of storms occur every day over the surface of the earth; this statement is based on observations carried on for years over widely separated areas. The most "thundery" spot in the world is the island of Java, where about 225 storm days occur each year. Central Africa rates next to Java.

The approach of storms in summer is heralded by an area of low pressure. A light southerly wind prevails. The sky becomes hazy or streaked with clouds. The temperature rises; the air becomes uncomfortably humid; local thunderstorms may occur. Whether rain falls or not, the temperature continues to rise until the center of low pressure passes, when the wind shifts to the west or northwest and a welcome, coolness ensues, with a drop of ten

or twenty degrees in temperature. The center of the cyclonic area is marked by rain, which results from the rapid condensation of vapor in the cooling clouds. Such are the characteristic phenomena of a summer storm in the Mississippi Valley.

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Storms are most frequent in the spring and fall months, and occur oftener in winter than in summer. They attain their maximum violence over the sea, where the wind often blows with such velocity as to be a menace to shipping. Their average duration is about three days, but may be longer.

Though few people enjoy stormy weather, storms are a necessity. Without them we would be deprived of rain or snow and of that variation of temperature so essential to the maintenance of health and the assurance of good crops.

R.H.W.

Related Subjects. More detailed information as to the causes and character of storms will be found in the following articles:

Blizzard Rain
Cyclone Snow
Hail Tornado
Hurricane Typhoon
Lightning Weather
Monsoon Whirlwind
Norther Wind

STORMY PETREL. See Petrel. STORTHING, stawr' ting, the legislative

body of Norway. See Norway (Government).

STORY, EMMA HAYDEN, the real name of Emma Eames (which see).

STORY, JOSEPH (1779-1845), an Associate Justice of the United States Supreme Court. He was born at Marblehead, Mass., was graduated at Harvard in 1798, and three years later began the practice of law. His success was immediate, and he



Photo: Brown Bros

JOSEPH STORY

became active in politics, serving in the state legislature and in Congress, where he became known as a leader of the Republican (afterward the Democratic) party. President Madison appointed him an Associate Justice of the Supreme Court in 1811, and he served for thirty-four years, exercising an important influence on American constitutional law. The most celebrated case in which Justice Story wrote the opinion was the Dartmouth College Case, though Chief Justice Marshall handed down the decision. From 1829 until his death, Story was professor of law at Harvard College. See Dartmouth College, subhead.



TORY-TELLING. Children have always known that there is nothing in the world more delightful than a good story, well told, but grown people had forgotten the fact for many, many centuries. Time was, in the younger days of the world, when kings and warriors knew no higher pleasure than listening to tales about brave men and beautiful women, but when books became common, the storytellers lost their hold on their audiences, and gradually the art of story-telling was almost lost. Mothers, to be sure, still told tales to their children in the firelight, but the wider phases were almost unknown.

In very recent years, however, there has been a rebirth of the ancient art. Not only do mothers and teachers make constant use of it, but professional story-tellers delight men and women, as well as children, with this new-old form of entertainment.

The Purposes of Story-Telling. The child, with his incessant demand for stories and "just one more" story, has but one idea in mind—to be amused and entertained. The mother or teacher who makes use of stories for other purposes must therefore bear one fact in mind: unless the story is interesting, the child will not listen; and if he does not listen, the other purposes are defeated at the outset. The first great purpose of story-telling, then, must be to entertain. Nor need this be looked upon as an unworthy aim. The picture, the statue, and the poem exist to give joy, and the story is but another means for appealing to the love for the beautiful.

But story-telling may and does accomplish other things. It may be made, without developing an unpleasantly aggressive moral character, to teach lessons of thoughtfulness, of patriotism, and of faith. In fact, the story furnishes so surely the easiest and most direct road to the child's heart and conscience that one wonders how the mother who cannot or will not tell her children stories ever teaches them any moral lessons.

Then, too, story-telling develops the imagination. There is little danger that, as some parents fear, the child's imagination will be overdeveloped by the use of fairy tales or myths; the danger is far greater that, without these aids, the imagination will be totally undeveloped, and the person will live always in the valleys and never on the mountain tops,

where imagination gives him the right and the ability to live.

From the teacher's point of view, it is of the utmost importance that a love for nature, for history, for many of the works of the great authors, may be awakened by means of stories. This does not mean that the pupils should be given their nature study, their history, or their literature, all in the form of stories; these should be merely the introduction, the appetizer which stimulates a desire for the more solid things.

Other purposes may be mentioned briefly. Powers of concentration are strengthened by listening to stories; the vocabulary is increased and the foundations of an easy, grammatical English style are laid unconsciously. A child's comprehension and sympathies are broadened, too, and he is brought into contact with lives spent amid entirely different surroundings from his own.

How to Choose a Story. Of course, the purpose for which a story is told influences to a certain extent the choice; but there are certain qualities which every story must possess if it is to fulfill any purpose. Older people may listen, through courtesy, to things in which they are not interested, but the child has no conscience in this matter—he listens only to what is so interesting that it holds his attention in spite of himself.

First of all, the story must have action, from beginning to end, and all the action must point to one definite conclusion. Explanations, long descriptions, and "preaching" have no place in a story. Frequently, a practiced story-teller can see in some tale overburdened with these undesirable elements a basis of action which is just what she wants, and can prune away all that retards this action. This one principle cannot be too strongly emphasized—the action need not be particularly exciting, but there must be something happening all the time.

Much depends, too, on the beginning of the story. It must be direct and simple, and must locate the story at once in the child's mind. This does not mean that a definite situation is necessary—the familiar "once upon a time" or "in a wonderful far-off country" answers all requirements, but the hearer must not be left to "flounder." Introductory matter, unless of the very briefest, should be omitted. Unless the

child's attention is held from the very first word, it is difficult to gain later.

No less important is the ending. Stories for grown-ups may present a "section of life," with no solution of the problems raised, no definite rounding-out of the lives of the characters, but children will tolerate no such halfway measures. Everything must be settled, once and for all, before the curtain falls. And the child is perfectly correct, from his own point of view, in demanding a happy ending. He has an innate feeling of justice which tells him that good people should be rewarded and bad people punished, and unless the story works out in that way, there is something wrong with the story. He knows nothing of the complicated ethics of later years, which finds it difficult to separate right from wrong.

One other point is worth remembering. The story must have "points of contact" with the children's experiences; that is, it must present images of familiar objects, though these may be placed amid unfamiliar surroundings or tinged with mystery. The children, for instance, have never seen a princess; but as the story proceeds, it is evident after all that a princess is only a little girl who has to mind her father and mother, just as they have to mind their fathers and mothers. There is enough difference to lend interest, but enough similarity

to make comprehension possible.

It is found by story-tellers everywhere that children have a particular fondness for repetition of phrases or sentences within the stories. In the nonsense tale of Epaminondas and His Auntie, for instance, Mother's "Epaminondas, you ain't got the sense you was born with" never fails to evoke a delighted grin at every repetition. There seems to be a charm in coming across, in the midst of the newness, a phrase or sentence that has been heard before. Of course, repetition is not really necessary to a successful story, but it is highly desirable.

The story-teller should remember, too, that the vocabulary of the children and their ability to use English are certain to be influenced by the stories to which they listen so absorbedly, and she should choose only such as have a pleasing English style. They need not, in fact should not, be in formal, bookish English, but they should make use of no expressions which

the child may not safely adopt.

How to Tell a Story. The story may be told for the most excellent of purposes, and it may possess all the characteristics of the perfect tale, but if it is not well told, it cannot fulfill its whole aim. This should not discourage anyone from attempting to tell stories, however, for, while every one cannot be a natural storyteller with the real "gift," every one may learn to tell a story acceptably. Very much, of course, depends on the personality, but there are certain rules which, if followed, are certain to bring success. The actual telling is the dynamic, the creative, part of the story-teller's art—the part which can give her real joy, whether she confronts an audience of one or oi one hundred.

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Know the Story Thoroughly. This might seem an unnecessary warning, but the spectacle is painfully familiar of the story-teller who knows her material only fairly well, and who finds it necessary to repeat, to go back and pick up dropped threads, to make explanations of points that should have been perfectly clear. The story should be so familiar that the teller does not have to think ahead, but can have her mind on each point as she brings it out.

This does not mean that the story should be memorized; indeed, the memorized tale is almost certain to sound more like a recitation than like a genuine "told" story. Nor does it mean that the same words must always be Probably there will be changes every time the story is told, but if there are any of those repetitions in which children delight, or conversations or specially favored passages,

they should not be changed.

Feel the Story. If the story-teller, after careful study, feels that a certain story is dull or silly, she should not attempt to tell it, no matter how successfully others may have done so. In some way or other, the teller's feeling in regard to the story communicates itself to the hearers, and they will not enjoy to the full

a story which the teller is not enjoying.

Be Natural. Many people make a mistake in dealing with children by "talking down" to them or babying them. Children like to feel that the things that interest them are important enough to be dealt with in a grown-up manner, and they resent passively, if not actively, the honeyed voice and the "Now, my dear little children" attitude.

Be Graphic. The story-teller should have vividly before her mind the pictures in the story, and should present these as clearly and directly as possible. Too much thought of the words in which the story is being told works

against this graphicness.

Watch the Audience. Anyone who watches her audience, particularly if that audience be composed of children, can tell instantly whether or not she is pressing her points home. If the eyes cling to hers, and every expression of her face is mirrored unconsciously in theirs, she has no need to fear—she is in a fair way to become a successful story-teller.

Will to Succeed. There exists between the teller of the story and the listeners an unexplainable subtle connection which seems almost hypnotic. If the teller thoroughly enjoys a story herself and wills with all her might that her hearers shall enjoy it, she is likely to see a responsive, satisfied look appearing on the

faces of the listeners.

Good Stories to Tell

The following stories have all been found to appeal to children. They cover a wide range—the fable, the nature story, the supernatural tale—but they all possess that something which children love. At the close is given a supplementary list of stories.

SPRING STORIES

The Wind and the Sun

One spring day a dispute arose between the Wind and the Sun as to which was the stronger. As they were quarreling, they saw a traveler walking along the road, with a great cloak thrown about his shoulders.

"Now we may make trial of our strength," declared the Wind; "let us both try with all our might, and the one who can compel the traveler to take off his coat shall be acknowledged the more powerful."

"Agreed," said the Sun. "Let the contest begin."

The Wind began by sending a furious blast that nearly snatched the coat away, but the shivering traveler clutched it the more tightly, and drew it about him. The Wind puffed and tugged, and even brought a storm of rain and hail to help him, but the more it stormed, the more closely did the traveler wrap his cloak around him. Finally, the Wind admitted that he could not get it away, and sank down, defeated.

Then the Sun took his turn. He drove away the clouds the Wind had scattered, and shone with all his brightest beams on the man's shoulders. Hotter and hotter it grew until the traveler was really uncomfortable. He unfastened his coat, and then, as the Sun never stopped shining, he threw it back, and finally took it off and ran hastily into the shade. The Sun had won by gentleness what the Wind could not win by force.

The Ugly Duckling

It was glorious in the country; it was summer; the cornfields were yellow, the oats were green, the hay had been put up in stacks in the green meadows, and the Stork went about on his long, red legs, and chattered Egyptian, for this was the language he had learned from his mother. All around the fields and meadows were great woods, and in the midst of these woods, deep lakes. Yes, it was right glorious in the country.

In the midst of the sunshine there lay an old farm, with deep canals about it; and from the wall down to the water grew great burdocks, so high that little children could stand upright under the tallest of them. It was just as wild there as in the deepestwood, and here sat a Duck upon her nest; she had to hatch her Ducklings; but she was almost tired out before the little ones came, and she seldom had visitors. The other ducks liked better to swim about in the canals than to run up to sit under a burdock and gabble with her.

At last one eggshell after another burst open...
"Pip! pip!" each cried, and in all the eggs there were little things that stuck out their heads.

"Quack! quack!" said the Duck, and they all came quacking out as fast as they could, looking all around them under the green leaves; and the mother let them look as much as they liked, for green is good for the eye.

"How wide the world is!" said all the young ones; for they certainly had much more room now than when they were inside the eggs.

"D'ye think this is all the world?" said the mother. "That stretches far across the other side of the garden, quite into the parson's field; but I have never been there yet. I hope you are all together," and she stood up. "No, I have not all. The largest egg still lies there. How long is that to last? I am really tired of it." And so she sat down again.

"Well, how goes it?" asked an old Duck who had

come to pay her a visit.

"It takes a long time for this one egg," said the Duck who sat there. "It will not open. Now, only look at the others! They are the prettiest little Ducks I ever saw. They are all like their father; the rogue, he never comes to see me."

"Let me see the egg which will not burst," said the old Duck. "You may be sure it is a turkey's egg. I was once cheated in that way, and had much care and trouble with the young ones, for they are afraid of the water. Must I say it to you? I could not make them go in. I quacked, and I clacked, but it was no use. Let me see the egg. Yes, that's a turkey's egg. Let it lie there, and do you teach the other children to swim."

"I think I will sit on it a little longer," said the Duck. "I've sat so long now that I can sit a few days more."

"Just as you please," said the old Duck; and she

went away.

At last the great egg burst. "Pip! pip!" said the little one, and crept forth. He was so big and ugly. The Duck looked at him.

"It's a very large Duckling," said she. "None of the others looks like that; it really must be a turkey chick! Well, we shall soon find out. Into the water shall he go, even if I have to push him in."

The next day it was bright, beautiful weather; the sun shone on all the green burdocks. The Mother Duck with all her family went down to the canal. Splash! she jumped into the water. "Quack! quack!" she said, and one duckling after another plumped in. The water closed over their heads, but they came up in an instant, and swam off finely; their legs went of themselves, and they were all in the water; even the ugly gray Duckling swam with them.

"No, it's not a turkey," said she; "look how well he uses his legs, how straight he holds himself. It is my own child! On the whole, he's quite pretty, when one looks at him rightly. Quack! quack! come now with me, and I'll lead you out into the world, and present you in the duck yard; but keep close to me all the time, so that no one may tread on you, and look out for the cats."

And so they came into the duck yard. There was a terrible row going on in there, for two families were fighting about an eel's head, and so the cat got it.

"See, that's the way it goes in the world!" said the Mother Duck, and she whetted her beak, for she, too, wanted the eel's head. "Only use your legs," she said, "so that you can bustle about, and bend your necks before the old Duck yonder. She's the grandest of all here; she's of Spanish blood—that's why she's so fat; and do you see? she has a red rag around her leg; that's something very, very fine, and the greatest mark of honor a Duck can have; it means that one does not want to lose her,

and that she's known by the animals and by men, too. Hurry! hurry!—don't turn in your toes; a well-brought-up Duck turns its toes quite out, just like father and mother—so! Now bend your necks and say 'Quack!'

And they did so; but the other Ducks round about

looked at them, and said quite boldly:

"Look there! now we're to have this crowd, too! as if there were not enough of us already! And—fie!—how that Duckling yonder looks; we won't stand that!" And at once one Duck flew at him and bit him in the neck.

and bit him in the neck.
"Let him alone," said the mother; "he is not doing

anything to anyone."
"Yes, but he's too large and odd," said the Duck who had bitten him, "and so he must be put down."

"Those are pretty children the mother has," said the old Duck with the rag round her leg. "They're all pretty but that one; that is rather unlucky. I wish she could have that one over again."

"That cannot be done, my lady," said the Mother Duck. "He is not pretty, but he has a really good temper, and swims as well as any of the others; yes, I may even say it, a little better. I think he will grow up pretty; perhaps in time he will grow a little smaller; he lay too long in the egg, and therefore he has not quite the right shape." And she pinched him in the neck, and smoothed his feathers. "Besides, he is a drake," she said, "and so it does not matter much. I think he will be very strong: he makes his way already."

"The other ducklings are graceful enough," said the old Duck. "Make yourself at home; and if you find an eel's head, you may bring it to me."

And now they were at home. But the poor Duckling who had crept last out of the egg, and looked so ugly, was bitten and pushed and made fun of, as much by the ducks as by the chickens

much by the ducks as by the chickens.

"He is too big!" they all said. And the turkey cock, who had been born with spurs, and so thought he was an emperor, blew himself up, like a ship in full sail, and bore straight down upon him; then he gobbled and grew quite red in the face. The poor Duckling did not know where he dared stand or walk; he was quite unhappy because he looked ugly, and was the sport of the whole duck yard.

So it went on the first day; and then it grew worse and worse. The poor Duckling was hunted about by every one; even his brothers and sisters were quite angry with him, and said, "If the cat would only catch you, you ugly creature!" And the ducks bit him, and the chickens beat him, and the girl who had to feed the poultry kicked at him with her foot.

Then he ran and flew over the fence, and the little birds in the bushes flew up in fear.

"That is because I am so ugly!" thought the Duckling; and he shut his eyes, but flew on farther; and so he came out into the great moor, where the Wild Ducks lived. Here he lay the whole night long, he was so tired and sad.

Toward morning the Wild Ducks flew up, and looked at their new mate.

"What sort of a one are you?" they asked; and the Duckling turned about to each, and bowed as well as he could. "You are really very ugly!" said the Wild Ducks. "But that is all the same to us, so long as you do not marry into our family."

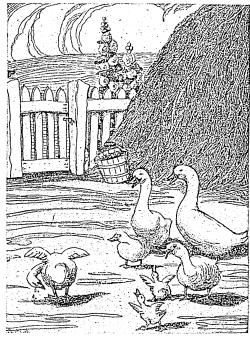
Poor thing! he certainly did not think of marrying, and only dared ask leave to lie among the reeds and drink some of the swamp water.

There he lay two whole days; then came thither two Wild Geese, or more truly, two Wild Ganders. It was not long since each had crept out of an egg, and that's why they were so saley.

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and that's why they were so saucy.

"Listen, comrade," said one of them. "You're so ugly that I like you. Will you go with us, and become a bird of passage? Near here is another moor, where there are a few sweet, lovely Wild Geese, all unmarried, and all able to say 'Quack!' You've a chance of making your fortune, ugly as you are."



"IF THE CAT WOULD ONLY CATCH YOU!"

"Piff! paff!" sounded through the air; and both the Ganders fell down dead in the reeds, and the water became blood red. "Piff! paff!" it sounded again, and the whole flock of Wild Geese flew up from the reeds. And then there was another report A great hunt was going on. The gunners lay around in the moor, and some were even sitting up in the branches of the trees, which spread far over the reeds. The blue smoke rose like clouds in among the dark trees, and hung over the water; and the hunting dogs came-splash, splash!-into the mud, and the rushes and reeds bent down on every side. That was a fright for the poor Duckling. He turned his head to put it under his wing; and at that very moment a frightful great dog stood close by the Duckling. His tongue hung far out of his mouth, and his eyes glared horribly. He put his nose close to the Duckling, showed his sharp teeth, andsplash, splash!—on he went without seizing it.

"Oh, Heaven be thanked!" sighed the Duckling. "I am so ugly that even the dog does not like to bite me!"

And so he lay quite quiet, while the shots rattled through the reeds and gun after gun was fired. At last, late in the day, all was still; but the poor little thing did not dare to rise up; he waited several hours still before he looked around, and then hurried away out of the moor as fast as he could. He ran on over

field and meadow; there was a storm, so that he had hard work to get away.

Toward evening the Duckling came to a peasant's poor little hut; it was so tumbled down that it did not itself know on which side it should fall; and that's why it stood up. The storm whistled around the Duckling in such a way that he had to sit down to keep from blowing away; and the wind blew worse and worse. Then he noticed that one of the hinges of the door had given way, and the door hung so slanting that he could slip through the crack into the room; and that is what he did.

Here lived an old woman, with her Cat and her Hen. And the Cat, whom she called Sonnie, could arch his back and purr; he could even give out sparks; but for that, one had to stroke his fur the wrong The Hen had quite small, short legs, and therefore she was called Chickabiddy Shortshanks; she laid good eggs, and the woman loved her as her

own child.

In the morning they noticed at once the strange Duckling, and the Cat began to purr and the Hen to cluck.

"What's this?" said the woman, and looked all around; but she could not see well, and therefore she thought the Duckling was a fat duck that had strayed. "This is a rare prize!" she said. "Now I shall have duck's eggs. I hope it is not a drake.

We must try that."

And so the Duckling was taken on trial for three weeks, but no eggs came. And the Cat was master of the house, and the Hen was the lady, and always said, "We and the world!" for they thought they were half the world, and by far the better half. It seemed to the Duckling that one might have another mind, but the Hen would not allow it.

"Can you lay eggs?"

"No."

"Then will you hold your tongue!"

And the Cat said, "Can you curve your back, and purr, and give out sparks?"

"No."

"Then you will please have no opinion of your

own when sensible folks are speaking!"

And the Duckling sat in a corner and was in low spirits; then he began to think of the fresh air and the sunshine; and he was seized with such a strange longing to swim in the water that he could not help telling the Hen of it.

"What are you thinking of?" cried the Hen. "You have nothing to do, that's why you have these fancies.

Lay eggs, or purr, and they will pass over."
"But it is so charming to swim in the water," said the Duckling, "so nice to feel it go over one's head, and to dive down to the bottom!"

"Yes, that's a fine thing, truly," said the Hen. "You are clean gone crazy. Ask the Cat about ithe's the cleverest thing I know-ask him if he likes to swim in the water, or to dive down: I won't speak about myself. Ask our mistress herself, the old woman; no one in the world knows more than she. Do you think she wants to swim, and to let the water close above her head?"

You don't understand me," said the Duckling. "We don't understand you! Then pray who is to understand you? You surely don't pretend to be cleverer than the Cat and the woman-I won't say anything of myself. Don't make a fool of yourself, child, and thank your Maker for all the good you have. Are you not come into a warm room, and have you not folks about you from whom you can

learn something? But you are a goose, and it is not pleasant to have you about. You may believe me, I speak for your good. I tell you things you won't like, and by that one may always know one's true friends! Only take care that you learn to lay eggs, or to purr and to give out sparks!"

"I think I will go out into the wide world," said

the Duckling.

And so the Duckling went away. He swam in the water, and dived, but he was shunned by every creature because he was so ugly.

Now came the fall of the year. The leaves in the wood turned yellow and brown; the wind caught them so that they danced about; and up in the air it was very cold. The clouds hung low, heavy with hail and snowflakes, and on the fence stood the raven, crying, "Croak! croak!" for mere cold; yes, one could freeze fast if one thought about it.

One evening-the sun was just going down in fine style-there came a whole flock of great, handsome birds out of the bushes; they were shining white, with long, supple necks; they were swans. uttered a very strange cry, spread forth their glorious great wings, and flew away from that cold region to warmer lands, to fair open lakes. They mounted so high, so high! and the ugly Duckling had such a strange feeling as he saw them! He turned round and round in the water like a wheel, stretched out his neck toward them, and uttered a cry, so high, so strange, that he feared as he heard it. Oh! he could not forget those beautiful, happy birds; and as soon as he could see them no longer, he dived down to the very bottom, and when he came up again, he was quite beside himself. He did not know what the birds were, nor where they were flying to; but he loved them more than he had ever loved anyone. He did not envy them at all. How could he think of wishing to have such loveliness as they had? He would have been glad if only the ducks would have let him be among them—the poor, ugly creature!

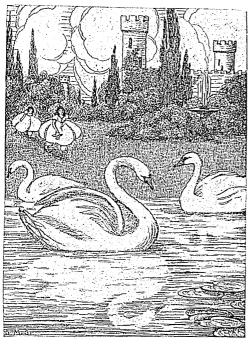
And the winter grew so cold, so cold! The Duckling had to swim about in the water, to keep it from freezing over; but every night the hole in which he swam about became smaller and smaller. It froze so hard that the icy cover sounded; and the Duckling had to use his legs all the time to keep the hole from freezing tight. At last he became worn out, and lay quite still, and thus froze fast in the ice.

Early in the morning, a peasant came by, and found him there; he took his wooden shoe, broke the ice to pieces, and carried the Duckling home to his wife. Then the Duckling came to himself again. The children wanted to play with him; but he thought they wanted to hurt him, and in his terror he flew up into the milk pan, so that the milk spilled over into the room. The woman screamed and shook her hand in the air, at which the Duckling flew down into the tub where they kept the butter, and then into the meal barrel and out again. How he looked then! The woman screamed, and struck at him with the fire tongs; the children tumbled over one another as they tried to catch the Duckling; and they laughed and they screamed!-well was it that the door stood open, and the poor creature was able to slip out between the bushes into the newly fallen snow. There he lay quite worn out.

But it would be too sad if I were to tell all the misery and need which the Duckling had to bear in the hard winter. He lay out on the moor among the reeds when the sun began to shine again and the

larks to sing; it was a beautiful spring.

Then all at once the Duckling could flap his wings: they beat the air more strongly than before, and bore him stoutly away; and before he well knew it, he found himself in a great garden, where the elder trees stood in flower, and bent their long, green branches down to the winding canal, and the lilacs smelt sweet. Oh, here it was beautiful, fresh, and



NO LONGER UGLY AND HATEFUL TO LOOK UPON

springlike! and from the thicket came three glorious white swans; they rustled their wings, and sat lightly on the water. The Duckling knew the splendid creatures, and felt a strange sadness, such as he had never known before.

"I will fly away to them, to the royal birds! and they will beat me, because I, that am so ugly, dare to come near them. But it is all the same. Better to be killed by them than to be chased by ducks, and beaten by fowls, and pushed about by the girl who takes care of the poultry yard, and to suffer hunger in winter!" And he flew out into the water, and swam toward the beautiful swans; these looked at him, and came sailing down upon him with outspread wings. "Kill me!" said the poor creature, and bent his head down upon the water, and waited for death. But what saw he in the clear water? He saw below him his own image; and, lo! it was no longer a clumsy, dark-gray bird, ugly and hateful to look at, but—a swan!

It matters nothing if one is born in a duck yard, if one has only lain in a swan's egg.

He felt quite glad at all the need and hard times he had borne; now he could joy in his good luck, in all the brightness that was round him. And the great swans swam round him and stroked him with their beaks.

Into the garden came little children, who threw bread and corn into the water; and the youngest cried, "There is a new one!" and the other children shouted, "Yes, a new one has come!" And they

clapped their hands and danced about, and ran to their father and mother; and bread and cake were thrown into the water; and they all said, "The new one is the most beautiful of all! so young and so handsome!" and the old swans bowed their heads before him. oon an area can rexer in the research the contract of the cont

Then he felt quite ashamed and hid his head under his wings, for he did not know what to do; he was so happy, and yet not at all proud, for a good heart is never proud. He thought how he had been driven about and mocked and despised; and now he heard them all saying that he was the most beautiful of all beautiful birds. And the lilacs bent their branches straight down into the water before him, and the sun shone warm and mild. Then his wings rustled; he lifted his slender neck and cried from the depths of his heart:

"I never dreamed of so much happiness when I was the Ugly Duckling."

SUMMER STORY A Little Dutch Hero

Holland is a little country, but the Dutch children love it just as much as you love your great, big country. There are many curious things to be seen there—the wooden shoes and the windmills and the odd little caps and the far-reaching gardens of tulips; but the most curious of all are the dikes which hold back the sea. For Holland is lower than the ocean, and some parts of it would be flooded every time the tide rises, were it not for these great walls which the people have built.

Little Hans knew what a dreadful thing it would be if the sea ever pushed through these walls; and when he walked or played with his little brother along the dikes, he used to tell him stories of how the sea tried and tried and tried to get into Holland, because Holland was so beautiful, and how the brave dikes keep it out.

One day Hans and his little brother had wandered in their playing very far from home—so far that Hans had grown tired, and climbed up on the dike to rest. The little brother was playing with stones at the foot of the dike. Suddenly he called out.

"Oh, Hans, what a funny little hole!"
"A hole," repeated Hans. "Where?"

"Right here," said the brother. "There's water in it."

Han's heart almost stopped beating as he slid down the dike, and he was still more frightened when he saw the hole. It was a very little hole, to be sure, but the water was oozing through, drop by drop; and Hans knew how quickly the angry sea could tear a great hole, if it were given the tiniest opening. He looked about, but there was no one in sight. And when he looked back at the hole, he could see that it had grown larger, so that now the water was trickling through in a little stream.

Hans thrust his forefinger into the hole, and found that it fitted exactly. Then he turned to his little brother.

"Run," he said; "run home as fast as you can and tell father that the dike is leaking."

The little fellow started off as fast as his short legs would carry him, and Hans was left alone, waiting and waiting. On the other side of the dike, the sea seemed to be muttering to itself as it splash—splash—splashed against the wall.

"I will come in—I will come in," it seemed to be saying.

Hans thrust his finger in deeper.

"You shall not come in—you shall not come in," he said aloud.

That was at first, when he was very brave, but later, when little brother could be seen no longer and when his finger began to grow cold and numb, he just kept very still, with his eyes on the road. Then his hand grew numb, and his arm and shoulder, and finally it seemed to him that his whole body was



"YOU SHALL NOT COME IN," HE SAID

frozen. Sharp cramp pains ran up his arm and down his side, and the sea seemed to be laughing at him for setting his little strength against its great power. Once he almost pulled his finger out, but then he thrust it in farther than ever, and leaned his head against the dike.

O, how long it seemed before, far off down the road, he saw a black spot. It was moving—it was coming nearer and nearer; and at last he could see his father and the neighbors, and could hear them shouting, "We're coming! We're coming!"

Very tenderly they drew out Hans's numb finger, and while they mended the dike with their pickaxes and shovels they praised him for his bravery, and told him that he was a real hero. And when the work was done, they marched home like an army, two and two, singing, and Hans rode on his father's shoulders.

And if you lived in Haarlem, you would hear to this day the story of the brave boy who held back the sea

AUTUMN STORIES

The Coming of the Corn Adapted from Hiawatha.

Hiawatha wanted, more than anything else in the world, the good of his people—that Indian tribe which he loved better than himself. As he wandered in the woods, he saw the squirrel and the wild goose, the strawberry, and the wild grape, and heard the splash of the fish in the river; but he wanted for his people something different, something better than all these.

And so he built a lodge in the forest, far away from his people, and there for seven days and seven nights he fasted, all the time sending up prayers to the Great Spirit for the good of his people. On the fourth day, as he lay half faint with hunger on his bed of leaves, he looked out between the poles of his wigwam and saw, approaching through the radiance of the sunset, a youth whom he had never seen before.

The young man was tall and straight, and so supple that he swayed in the wind like a sapling. His garments were green and yellow, his hair was long and yellow, and above his forehead green plumes waved. As Hiawatha lay wondering whether this were vision or reality, the youth approached and spoke to him.

"Hiawatha, your prayer has been answered, because it is not a selfish prayer, but asks for the good of your people. I, Mondamin, have been sent to show you how, with labor and struggle, that great good for which you pray may come. Rise and wrestle with me."

Weakly Hiawatha rose, but, with the first touch of the stranger, he felt himself grow stronger, and



WON AS A GIFT FOR HIS PEOPLE

more and more strength came to him as they wrestled, till the sunset light was gone.

"Enough," cried Mondamin. "You have wrestled well, Hiawatha; to-morrow, at the same hour, I shall come again to try my strength with yours."

With the words he was gone, and Hiawatha's strength went with him. But the next day, and

the next, when the sky was reddest with the sunset, Mondamin came again and wrestled with Hiawatha. Just before he vanished on that third day, he said, "To-morrow is the day of your triumph. You will conquer me, and then you must lay me in a shallow grave, where the gentle rain and the warm sun may reach me. But first take from me my green and yellow garments."

And on the fourth day, it happened as he had said. Hiawatha felt his strength coming to him in great waves, and he wrestled with such power that suddenly, before he knew how it had happened, Mondamin lay before him on the grass, dead.

Not quite understanding, but willing to obey, Hiawatha stripped the soiled and torn garments from the young stranger, and laid him under the soft mold. For days he watched beside the grave, keeping the earth soft above it, driving away the ravens, and pulling out the weeds. And at last, one morning, he saw peeping through the soft, black earth a tiny point of green. Soon it was a long, green spear, and before the summer was over, there stood above the grave where Mondamin had been laid the first maize plant, with its waving green plumes and its yellow, silken tresses—the wonderful Indian corn, which Hiawatha had won as a gift for his people.

Androcles and the Lion A story of gratitude

Long, long ago, in Rome, the great theater was crowded to the very top. The emperor, in his gorgeous purple robe, sat in his box with his attendants about him, and all the people, in their best clothes, sat on the marble seats, fairly holding their breath with excitement. For they were to see the sport that they liked best of all—a very cruel sport, it would seem to us. A runaway slave, who had been recaptured, was to be torn to pieces by a lion, and from the iron cage the roars of the savage beast could be heard from time to time.

Now the slave was led in, trembling. He fell on his knees in the center of the arena, and raised his clasped hands, pleading for mercy, toward the emperor; but the emperor's eyes were cold and hard, and the people shouted, "The lion! Bring in the lion."

Suddenly the great doors of the cage beneath the imperial box swung outward. There was a breathless pause, and then, slowly, as though he knew his prey could not escape him, the lion stepped out onto the sand of the arena. He was a lean and hungry lion, for he had been kept without food that he might be the more savage, and furnish better sport for the spectators. O, how powerful his claws looked; and how the people who were safe on the high seats trembled, as he snarled and showed his white teeth.

A moment he stood there, lashing his sides with his tail and turning his shaggy head from side to side. And then, suddenly, he spied the slave, crouched on the sand, with bowed head. The great cat began to creep slowly toward his prey, switching his tail and narrowing his eyes. The people scarcely breathed; would he never spring? Yes, he was crouching now for his leap! Just then the slave raised his head, and the lion, his powerful muscles already released for the spring, checked himself and fell short. And, marvel of marvels, instead of rushing at the cowering slave with steel claws out, the lion fairly groveled in the sand before him! He rubbed against the man and

fondled him with his paws, while the noise of his mighty purring reached to the farthest part of the great theater.

Then how the people shouted! And the emperor, leaning over the railing of his box, beckened to the slave to come near. With his hand on the lion's head, the slave approached.

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"Are you a worker of magic," queried the emperor, "or how have you tamed the most savage beast of the jungle?"

"Oh, most gracious majesty," replied the slave—for he was a learned slave and knew how to speak to an emperor—"thou knowest that I escaped from



ANDROCLES AND THE LION

a most cruel master and fled to Airica. There I hid in a cave on the edge of the desert, and one day there came into my cave a great lion.

"He whined and held up his paw, and I saw, sticking in it, a long thorn. Because I have always loved animals and cannot bear to see one suffer, I conquered my fear and drew out the thorn, and the beast, after licking my hands, left me.

"Thou knowest, too, most gracious sire, that I was taken and brought back to Rome, and condemned to be torn to pieces by a lion. This lion has a better memory than I have—I did not recognize him, but he knew me, and has spared my life, as thou hast seen."

The slave ceased, and the people, who had heard enough to guess at what had happened, sent up a mighty shout.

"Life and freedom! Life and freedom for the slave!" they cried.

And the emperor, to please himself as well as to please the people, said, "So great a marvel has never been seen in Rome. Both are free—the lion and the slave—and no man may again lay hands on them"

And with his hand still on the lion's head, the freed slave walked out.

The Larks in the Cornfield

Once upon a time, there lived in a great big cornfield a happy Lark family-a mother Lark and her little baby Larks. It was a beautiful, quiet place to live, but the mother Lark had one worry; she knew that, when the corn was ripe and the reapers came, their sharp scythes and their heavy shoes would hurt the little Larks. So she watched and listened very carefully, and when she had to leave the nest to gather food, she told the little Larks to watch and listen very carefully for any sign of the reapers' coming.

One day she came home and found the little Larks

almost fluttering out of the nest in their excitement. "Oh, mother, mother," they cried as soon as they could see her. "Take us away, take us away at once. To-day the farmer was walking with his sons in the cornfield, and he said, 'The corn is ripe and must be cut; let us get our neighbors to help us.' And he told his sons to go at once and ask all the neighbors to come to-morrow and help him reap his corn.

"Is that all?" laughed the mother Lark. "We'll not move to-day, and you needn't be frightened at all; for if he waits for his neighbors to come and do his reaping, we are safe for some time. Listen carefully to-morrow and tell me what he says.'

The next evening when she came home, she found the little Larks chattering and chirping with fear.

"Mother, dear mother," they cried all together, "you must surely move us now. To-day the farmer walked again in his cornfield, and we heard him say, 'This corn is very ripe; we cannot wait for our neighbors now. Go, my sons, and ask your uncles and your cousins and your grandfathers to come to-morrow and help us cut the corn.' And they went —we saw them go. Oh, mother, surely you will move us to-night."

But the mother Lark only laughed. "No," she said, "we'll not go to-night. We are safe enough yet. The uncles and cousins and grandfathers will be so busy cutting their own corn that they'll not disturb our field for a time. Go to sleep, my babies,

but listen carefully to-morrow."

The third evening the mother Lark came home and the little ones said, "To-day when the farmer came to his cornfield he was quite angry and gruff. 'This corn will be ruined; it's getting far too ripe,' he said, 'we'll wait no longer for our neighbors and our relatives-we'll cut the corn ourselves.' And he called his sons and sent them out to hire reapers to come and reap the corn to-morrow. But we weren't frightened, mother, for we know now that he never means what he says."

"Indeed," said the mother Lark, beginning to bustle about, "he means it this time. When a man attends to his own business instead of waiting for someone else to do it, the business gets done. Come,

children, we are moving out to-night."

WINTER STORIES

The Ant and the Grasshopper

There was once a foolish little grasshopper that spent all her time playing. Through the long summer and autumn, she did nothing but sing from morning till night. So when winter came, and the snow covered the ground, she hadn't a morsel of food stored away in her house.

Soon she was so faint with hunger that she begged her neighbor, the Ant, to give her something to eat. . "I am starving," she said; "give me a grain of wheat." "Why did you not save some grain at harvest time?" asked the Ant. "There was plenty to be had. What were you doing?"

"I was singing," answered the Grasshopper, "I

had no time for work."

"Hoity toity!" cried the Ant: "if you sang all summer, you must dance hungry to bed in winter."

The Fir Tree

Out in the forest stood a pretty little Fir Tree It had a good place; it could have sunlight, air there was in plenty, and all around grew many larger comrades-pines as well as firs. But the little Fir Tree wished ardently to become greater. It did not care for the warm sun and the fresh air; it took no notice of the peasant children, who went about talking together, when they had come out to look for strawberries and raspberries. The children often came with a whole basketful, or with a string of berries which they had strung on a straw. Then they would sit down by the little Fir Tree and say, "How pretty and small this one is!" The Fir Tree did not like that at all.

Next year he had grown bigger, and the following

year he was taller still.

"Oh, if I were only as tall as the others!" sighed the little Fir. "Then I would spread my branches far around and look out from my crown into the wide world. The birds would then build nests in my boughs, and when the wind blew, I would nod grandly.

It took no pleasure in the sunshine, in the birds, or in the red clouds that went sailing over it morning

and evening.

When it was winter, and the snow lay all around, white and sparkling, a hare would often come jumping along and spring right over the little Fir Tree. that made him so angry! But two winters went by, and when the third came, the little Tree had grown so tall that the hare was obliged to run around it.

"Oh, to grow, to grow, and become old; that's the only fine thing in the world," thought the Tree.

In the autumn, the woodcutters always came and felled a few of the largest trees; that was done this year, too, and the little Fir Tree, that was now quite well grown, shuddered with fear, for the stately trees fell to the ground with a crash, and their branches were cut off, so that the trees looked quite naked, long, and slender, and could hardly be recog-Then they were laid upon wagons, and the horses dragged them away out of the wood. Where were they going? What destiny awaited them?

In the spring, when the Swallows and the Stork came, the Tree asked them, "Do you know where the big firs were taken? Did you meet them?

The Swallows knew nothing about it, but the Stork looked thoughtful, nodded his head, and said:

"Yes, I think so. I met many new ships when I flew out of Egypt; on the ships were tall masts; I fancy these were the trees. They smelt like fir. I can assure you they're stately—very stately.

"Oh, that I were big enough to go over the sea. What kind of a thing is this sea, and how does it

"It would take long to explain all that," said the Stork, and he went away.

"Rejoice in thy youth," said the Sunbeams; "rejoice in thy fresh growth, and in the young life that is within thee."

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And the Wind kissed the Tree, and the Dew wept tears upon it; but the Fir Tree did not understand.

When Christmas time approached, quite young trees were felled, sometimes trees which were neither so old nor so large as this Fir Tree, that never rested but always wanted to go away. These beautiful young trees kept all their branches; they were put upon wagons, and horses dragged them away out of the wood.

"Where are they all going?" asked the Fir Tree. "They are not greater than I-indeed, one of them was much smaller. Why do they keep all their branches? Whither are they taken?"

"We know that! We know that!" chirped the Sparrows. "Yonder in the town we looked in at the windows. We know where the fir trees go. We have looked in at the windows and have seen that they are planted in the middle of a warm room, and dressed up in the greatest splendor with the most beautiful things-gilt apples, honey cakes, playthings, and many hundreds of candles."

"And then?" asked the Fir Tree, trembling through all its branches. "And then? what happens then?

"Why, we have not seen anything more. it was wonderful!"

"Perhaps I may be destined to this glorious end

one day!" cried the Fir Tree, rejoicing.

"That is even better than traveling across the 'sea. How I long for it! If it were only Christmas! Now I am great and grown-up, like the rest who were led away last year. Oh, if I were only on the wagon! If I were only in the warm room amidst all the pomp and splendor! And then? Yes, then something even better will come, something far more charming, else why should they adorn me so? There must be something grander, something greater still to come; but what? Oh! I'm suffering, I'm longing! I don't know myself what is the matter with me!"

"Rejoice in us," said Air and Sunshine. joice in thy fresh youth here in the woodland."

The Fir Tree did not rejoice at all, but it grew and grew; winter and summer it stood there, green, dark green. The people who saw it said, "That's a handsome tree!" and at Christmas time it was felled before any of the others. The ax cut deep into its marrow, and the tree fell to the ground with a sigh; it felt a pain, a sensation of faintness, and could not think at all of happiness, for it was sad at parting from its home, from the place where it had grown up; it knew that it should never again see the dear old companions, the little bushes and the flowers all around, perhaps not even the birds.

The Tree came to itself only when it was unloaded in a yard, with other trees, and heard a man say:

"This one is famous; we want only this one for our Christmas!"

Now two servants came, in gay liveries, and carried the Fir Tree into a large, beautiful room. All around the walls hung pictures, and by the great stove stood large Chinese vases with lions on the covers; there were rocking chairs, silken sofas, great tables covered with picture books, and toys worth a hundred times a hundred dollars; at least, the children said so. And the Fir Tree was put into a great tub filled with sand; but no one could see that it was a tub, for it was hung round with green cloth, and stood on a large, manycolored carpet. Oh, how the Tree trembled! What was to happen now? The servants, and the young

ladies, also, decked it out. On one branch they hung little bags cut out of colored paper, and every bag was filled with sweetmeats. Golden apples and walnuts hung down as if they grew there, and more than a hundred little candles, red, white, and blue, were fastened to the different boughs. Dolls that looked exactly like real people—the Tree had never seen such before-swung among the foliage,



"YONDER IN THE TOWN WE LOOKED IN AT THE WINDOWS"

and high on the summit of the Tree was fixed a tinsel star. It was splendid.
"This evening," said all, "this evening it will

shine."

"Oh." thought the Tree, "that it were evening already! Oh, that the lights may be soon lit! When will that be done? I wonder if trees will come out of the forest to look at me? Will the Sparrows fly against the panes? Shall I grow fast here, and stand adorned in summer and winter?"

But the Tree had a backache from mere longing, and the backache is just as bad for a tree as the headache for a person.

At last the candles were lighted. What a brilliance! what a splendor! The Tree trembled so in all its branches that one of the candles set fire to a green twig, and it was scorched, but one of the young ladies hastily put the fire out.

Now the Tree might not even tremble. Oh, that was terrible! It was so afraid of setting fire to some . of its ornaments, and it was quite bewildered with all the brilliance. And now the folding doors were thrown open, and a number of children rushed in as if they would have overturned the whole Tree, while the older people followed more deliberately. The little ones stood quite silent, but only for a minute; then they shouted till the room rang; they danced gleefully round the Tree, and one present after another was plucked from it.

"What are they about?" thought the Tres. "What's going to be done?"

And the candles burned down to the twigs, and as they burned down, they were extinguished, and then the children were given permission to plunder the Tree. They rushed in upon it, so that every branch cracked again; if it had not been fastened by the top and by the golden star to the ceiling, the Tree certainly would have fallen down.

The children danced about with their pretty toys. No one looked at the Tree except one old man, who came up and peeped among the branches, but only to see if a fig or an apple had not been forgotten.

"A story! A story!" shouted the children, as they drew a little fat man toward the Tree. He sat down just beneath it—"for then we shall be in the green wood," said he, "and the Tree may have the advantage of listening to my tale. But I can tell only one. Will you hear the story of Ivede-Avede, or of Klumpey-Dumpey, who fell downstairs, and still was raised up to honor and married the princess?"

"Ivede-Avede," cried some; "Klumpey-Dumpey," cried others, and there was a great crying and shouting. Only the Fir Tree was silent, and thought, "Shall I not be in it?" Shall I have nothing to do in it?" But he had been in the evening's amusement and had done what was required of him.

And the fat man told about Klumpey-Dumpey, who fell downstairs, and yet was raised to honor and married the princess. And the children clapped their hands, and cried, "Tell another, tell another!" for they wanted to hear about Ivede-Avede; but they got only the story of Klumpey-Dumpey.

The Fir Tree stood quite silent and thoughtful; never had the birds in the wood told such a story as that; Klumpey-Dumpey fell downstairs, and yet came to honor and married the princess at last!

"Yes, so it happens in the world!" thought the Fir Tree, and believed it must be true, because that was such a nice man who fold it

was such a nice man who told it.

"Well, who can know? Perhaps I shall fall downstairs, too, and marry a princess!" And it looked forward with pleasure to being adorned again, the next evening, with candles and toys, gold and fruit.

"To-morrow I shall not tremble," it thought. "I shall rejoice in all my splendor. To-morrow I shall hear the story of Klumpey-Dumpey again, or perhaps that of Ivede-Avede, too."

And the Tree stood all night quiet and thought-

In the morning, the servants and the chambermaid came in.

"Now my splendor will begin afresh," thought the Tree.

But they dragged him out of the room and upstairs to the garret, and there they put him in a dark corner where no daylight shone.

"What's the meaning of this?" thought the Tree. "What am I to do here? What is to happen?"

And he leaned against the wall, and thought, and thought. And he had time enough, for days and nights went by, and nobody came up; and when at length some one came, it was only to put some great boxes in a corner. Now the Tree stood quite hidden away, and the supposition is that it was quite forgotten.

"Now it's winter outside," thought the Tree.
"The earth is hard and covered with snow, and
people cannot plant me; therefore I suppose I'm
to be sheltered here until spring comes. How considerate that is! How good people are! If it were

only not so dark here, and so terribly solitary! Not even a little hare! It was pretty out there in the wood, when the snow lay thick and the hare sprang past; yes, even when he jumped over me; but then I did not like it. It is terribly lonely up here!"

"Piep! Piep!" said a little Mouse, and crept forward, and then came another little one. They smelt at the Fir Tree, and then slipped among the

"It's horribly cold," said the two little Mice, "or else it would be comfortable here. Don't you think so, old Fir Tree?"

"I'm not old at all," said the Fir Tree. "There are many much older than I."

"Where do you come from?" asked the Mice. "And what do you know?" They were dreadfully inquisitive.

"Tell us about the most beautiful spot on the earth. Have you been there? Have you been in the storeroom, where cheeses lie on the shelves, and hams hang from the ceiling; where one dances on tallow candles, and goes in thin and comes out fat?"

"I don't know that," replied the Tree; "but I know the wood, where the sun shines and the birds sing."

And then it told all about its youth.

And the little Mice had never heard anything of the kind; and they listened, and said:

"What a number of things you have seen! How happy you must have been!"

"Îr" replied the Fir Tree; and it thought about what it had told. "Yes, those were really quite happy times." But then he told of the Christmas Eve, when he had been hung with sweetmeats and candles.

"Oh!" said the little Mice, "how happy you have been, you old Fir Tree!"

"I'm not old at all," said the Tree. "I came out of the wood only this winter. I'm only rather backward in my growth."

"What splendid stories you can tell!" said the little Mice.

And next night they came with four other little Mice, to hear what the Tree had to relate: and the more it said, the more clearly did it remember everything, and thought, "Those were quite merry days. But they may come again. Klumpey-Dumpey fell downstairs, and yet he married the princess. Perhaps I may marry a princess, too!" And then the Fir Tree thought of a pretty little Birch Tree that grew out in the forest; for the Fir Tree, that Birch was a real princess.

"Who's Klumpey-Dumpey?" asked the little Mice.

And then the Fir Tree told the whole story. It could remember every single word; and the little Mice were ready to leap to the very top of the tree with pleasure. Next night a great many more Mice came, and on Sunday two Rats even appeared; but these thought the story was not pretty, and the little Mice were sorry for that, for now they also did not like it so much as before.

"Do you know only one story?" asked the Rats.
"Only that one," replied the Tree. "I heard that
on the happiest evening of my life; I did not think
then how happy I was."

"That's a very miserable story. Don't you know any about bacon and tallow candles—a storeroom story?"

"No," said the Tree.

"Then we'd rather not hear you," said the Rats. And they went back to their own people. The little Mice at last also stayed away; and then the Tree sighed and said, "It was very nice when they sat around me, the merry little Mice, and listened when I spoke to them. Now that's past, too. But I shall remember to be pleased when they take me out."

But when did that happen? Why, it was one morning that people came and rummaged in the garret; the boxes were put away, and the Tree was brought out; they certainly threw him rather roughly on the floor, but a servant dragged him away at once to the stairs, where the daylight shone.

"Now life is beginning again," thought the Tree. It felt the fresh air and the first sunbeams, and then it was out in the courtyard. Everything passed so quickly that the Tree quite forgot to look at itself, there was so much to look at all around. The courtyard was close to a garden, and there everything was blooming; the roses hung fresh and fragrant over the little paling, the linden trees were in blossom, and the swallows cried, "Quinze-wit! quinze-wit! my husband's come!" But it was not the Fir Tree that they meant.

that they meant.
"Now I shall live!" cried the Tree, rejoicingly, and spread its branches far out; but, alas! they were all withered and yellow, and it lay in the corner among nettles and weeds. The tinsel star was still upon it, and shone in the bright sunshine.

In the courtyard, a couple of the merry children were playing, who had danced round the Tree at Christmas time, and had rejoiced over it. One of the youngest ran up and tore off the golden star.

"Look at what is sticking to the ugly old Fir Tree!" said the child, and he trod on the branches till they cracked under his boots.

And the Tree looked at all the blooming flowers and the splendor of the garden, then looked at itself, and wished it had remained in the dark corner of the garret; it thought of its fresh youth in the wood, of the merry Christmas Eve, and of the little Mice which had listened so pleasantly to the story of

Klumpey-Dumpey.

"Past! past!" said the old Tree. "Had I but rejoiced when I could have done so! Past! past!"

And the servant came and chopped the Tree into little pieces; a whole bundle lay there; it blazed brightly under the great boiling copper, and it sighed deeply, and each sigh was like a little shot; and the children, who were at play there, ran up, seated themselves by the fire, looked into it, and cried "Puff! puff!" But at each explosion, which was a deep sigh, the Tree thought of a summer day in the woods, or of a winter night there, when the stars beamed; he thought of Christmas Eve and of Klumpey-Dumpey, the only story he had ever heard or knew how to tell; and thus the Tree was burned.

The boys played in the garden, and the youngest had on his breast a golden star, which the Tree had worn on its happiest evening. Now that was past, and the Tree's life was past, and the story is past, too: past! past!—and that's the way with all stories.

The Little Match Girl

It was on a bitterly cold and snowy New Year's Eve. A little girl was wandering in the dark, cold streets; she was bareheaded and barefooted. She had certainly worn slippers when she left home, but they were not much good, for they were so huge.

They had last been worn by her mother, and they fell off the child's feet when she was running across the street, to avoid some carriages that were rolling by. One of the shoes could not be found at all; and the other was picked up by a boy who ran off with SOCKO DO TENENTININA PARE PORTO PREFERENCIA DE PREFERENCIA PORTO P



HER LITTLE HANDS WERE STIFF WITH COLD

it, saying that it would do for a cradle when he had children of his own. So the poor little girl had to go on with her little bare feet, which were red and blue with cold.

She carried a quantity of matches in her apron, and she held a packet of them in her hand. Nobody had bought any of her during all the long day; nobody had given her a penny. The poor little creature was hungry and perishing with cold, and she looked the picture of misery. The snowflakes fell upon her long, yellow hair, which curled so prettily about her face, but she paid no attention to that.

Lights were shining from every window, and there was a most delicious odor of roast goose in the streets, for it was New Year's Eve—she could not forget that. She found a corner where one house projected a little beyond the next one, and here she crouched, drawing up her feet under her, but she was colder than ever. She did not dare go home, for she had not sold any matches, and had not earned a single penny. Her father would beat her; besides, it was almost as cold at home as it was here. They had only the roof over them, and the wind whistled through it, although they stuffed up the biggest

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cracks with rags and straw. Her little hands were stiff with cold.

Oh, one little match would do some good! Should she pull one out of the bundle and strike it on the wall to warm her fingers? She pulled one out. Critch, how it spluttered, how it blazed! It burned with a bright, clear flame, just like a little candle when she held her hand round it.

It was a very curious candle, too. In its light the little girl fancied she was sitting in front of a big stove with polished brass feet and handles. There was a splendid fire blazing in it and warming her so beautifully, but-what happened?-just as she was stretching out her feet to warm them, the blaze went out, the stove vanished, and she was left sitting with the end of the burned-out match in her hand.

She struck a new one: it burned, blazed up, and where the light fell upon the wall, it became transparent like gauze, and she could see right through it into the room. The table was spread with a snowy cloth and pretty china; a roast goose stuffed with apples and prunes was steaming on it. And, what was even better, the goose hopped from the dish with the carving knife sticking in his back, and it waddled across the floor. It came right up to the poor child, and then-the match went out, and there was nothing left to be seen but the thick, black wall.

Again, she lit another match. This time she was sitting under a lovely Christmas tree. It was much larger and more beautifully decorated than the one she had seen when she peeped through glass doors at the rich merchant's house this very last Christmas. Thousands of lighted candles gleamed upon its branches, and colored pictures such as she had seen in the shop windows looked down upon her. The little girl stretched out her hands to touch them, but out went the match.

All the Christmas candles rose higher and higher, till she saw that they were only the twinkling stars.

So she struck another match against the wall, and this time it was her grandmother who appeared in the circle of the flame. She saw her quite clearly and distinctly, looking so gentle and happy.

"Grandmother!" cried the little creature, "Oh, do take me with you! I know you will vanish when the match goes out; you will vanish like the warm stove, and the goose, and the Christmas tree.'

She hastily struck a whole bundle of matches, because she did so long to keep her grandmother with her. The light of the matches made it as bright as day. Grandmother had never before looked so big, nor so beautiful. She lifted the little match girl up in her arms, and they soared in a circle of light and joy, far, far above the earth, where there was no more cold, no hunger, no pain, for they were with God.

OTHER STORIES Baucis and Philemon

Long, long ago, in a far-away land called Greece, lived people who were very different in some ways from those who live to-day. About some things they knew more than any people who have lived since their time. They made statues and built temples which were more beautiful than any made in later ages, but about some things they knew very little. They had no correct ideas as to how the earth was made, and they believed that there were many gods, who knew all about everything in the world, and who made things happen just as they pleased.

The gods, they believed, could make themselves look like anything they wanted to-so exactly like that not even the brightest eves could tell the difference. And the old Greeks used to be very fond of telling their children stories about the times when the gods made themselves look like human beings, and came to visit men and women. Then the people whom they visited did not guess that their guests were not men and women just like themselves, and sometimes this was very unpleasant; for if the gods did not like what people were doing and saying, they punished the offenders. One of the stories which the Greek children liked best vou may read here.

One day the king of the gods, the wisest and strongest of them all, whose name was Jupiter, called one of his sons to him and said:

'Come, Mercury, let us go and see how the people in Phrygia are behaving themselves."

Mercury was always very glad to go any place with his father, and, in a little while, he was ready.

"But, my son," said Jupiter, "you cannot wear your wings. Everybody who sees you will guess who you are."

"O father," cried Mercury, "I get so tired without my wings."

"Never mind," replied the father: "you may take your staff, which will help you just as much. Nobody will notice that."

It must have been a very strange staff which could be as much help to a boy as a pair of wings, and so, indeed, it was. For it had two little wings of its own, and it made the person who carried it so light that he could scarcely keep his feet on the ground.

The clothes which Jupiter and Mercury put on for this trip were old and shabby, and so, when they came to the town in Phrygia which they meant to visit, people thought they were just beggars. Now, if they had come riding on fine horses, and wearing gold chains about their necks and diamond rings on their fingers, the people in this wicked town would have given them their softest, whitest beds to sleep in, and would have cooked for them fine dinners, for they were always ready to give good things to people who could just as well have paid for them. But when poor, hungry men came to the town, children were sent out to drive them away, and-for the people were very wicked—fierce dogs were turned loose. And that's the way they treated Jupiter and Mercury. How different it would have been had they known who their visitors were!

Mercury, who was young and proud, and had always been used to having his own way, grew very angry, and cried to his father, "Just let me wave my staff over these wicked children and dogs, and turn them all into stone children and iron dogs." But Jupiter said, "No; let us see just how bad they really can be.

So the two travelers were chased out of the village and up a little hill, almost to the gate of a cottage which stood back from the country road. Now it was evening by the time they reached this place, and the two old people who lived in the cottage had finished their work and eaten their supper, and were sitting on a bench beside their door. It was a very hard bench and a very plain, low door, for old Philemon and his wife Baucis were as poor as Jupiter and Mercury looked in their old clothes. But the old couple were very different from the bad people in the town, and as soon as they saw the two men coming, they hurried to the gate as fast as their old feet would take them, and Philemon cried:

"Come in! Come in! Have those saucy children and those snappy dogs been treating you as they treat every stranger? You'll find no saucy children or snappy dog here."

Jupiter and Mercury, smiling at each other, followed the old people to the cottage door, and sat down on the bench there.

"I'm very sorry," said Baucis, "that there is so little in the house to give you to eat. You can see without my telling you that we are very poor. But what there is, I shall be very glad to give you."

While Philemon talked to the visitors and brought water in a wooden bowl that they might wash, his old wife got supper. And even though she thought the visitors were only beggar men, she was just as careful about the meal as she would have been had she known that they were really gods.

Finally, she called Philemon in and said:

"Everything is ready, but this table is so crooked that I am ashamed to ask them to sit at it. One leg is shorter than the rest."

It was hard for Philemon to get down on his knees, for he was old and stiff; but he knelt and shoved pieces of slate under the short table leg, until that corner was as high as the rest. Then Baucis put the supper on the table and called the guests.

And after all, it was not such a bad supper. There was a stew-not very rich or very strong, it is true, but piping hot and nicely seasoned; and there was cheese and brown bread and honey and milk. To be sure, the pitcher that held the milk and the bowl that held the stew were of the commonest brown ware, while the cups and the plates were of wood. But these things the visitors did not seem to mind at all.

Poor Baucis was very much worried for fear there was not enough milk, for the strangers seemed very thirsty after their walk; and when Mercury asked for the third cup of milk, she said sadly, "I'm sorry, young man, but the milk is all gone. I poured the last of it into your cup."

Mercury winked at his father, and there was even a twinkle in Jupiter's eye, though the old people did not see it.

"Just try and see," said Mercury; "maybe you can squeeze out a drop for me."

To show him that she was right, Baucis seized the pitcher and held it upside down over his cup; when lo and behold! the milk came flowing out in such a stream that it filled the cup and ran over onto the floor. Baucis was so startled that she almost dropped the pitcher. She knew that there was no mistake; the pitcher had been empty and was now full, yet no one had poured in a drop. It did not take her as long to guess what had happened as it would take you or me if such a thing should come to pass in our homes; and as soon as she could speak, she cried:

"O Philemon, these are the gods, for nobody but a god could fill an empty pitcher without even touching it. Get down on your knees, Philemon, for these are in truth the gods!"

This time it did not take Philemon so long to kneel-he never stopped to think of his age and stiffness, but down he dropped beside his wife. They both hid their faces in their hands, for they were frightened half to death-not because they had done anything bad, for they knew they hadn't; but just because it was all so wonderful that it almost took their breath away.

"Do not be afraid, good people," said Jupiter in a deep voice. "It is true that we are gods. I am Jupiter, and this is Mercury. But no one who does good need fear the gods, and to you we shall bring nothing but happiness, because you were kind to us when you knew not who we were. The pitcher of milk shall never be empty, no matter how much you drink; the loaf of bread shall never be eaten up. no matter how much you eat, and there shall always be honey to eat with your bread."

"But, father," put in Mercury, "what about those bad people in the village yonder?"

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Spoiled boy that he was, he was thinking much more about the punishment that should come to the bad people whose children had thrown stones at him, and whose dogs had torn his clothes, than he was about any reward for the good people who had fed him.

"Come," said Jupiter, "let us go out and look at the village."

Baucis and Philemon scrambled to their feet and followed their guests out of doors, still too excited to speak. From the hilltop on which their house stood, they looked down toward the village, as they had done every day of their life there. They expected to see the white houses with their dark roofs and the higher roofs of the temples shining in the bright moonlight; but at the sight they saw they could only stand and gasp. There was no village there! The valley in which it had stood was filled to the brimalmost to their very gate, in fact—with a lake; and the moon was shining across the lake, making a silver road.

"Our neighbors!" gasped Baucis and Philemon

together. "Are they drowned?"
"All turned into fishes," replied Jupiter, "and that's better than they deserved, heartless wretches that they were. Now look behind you, Baucis and Philemon, and see whether you like that sight any better.'

The two old people were beginning to feel that they could not bear many more surprises, but they turned slowly and looked at their house. And right before their eyes they saw the poor little cottage changing to a great palace of white marble, with wide marble steps.

"Come," said Mercury, "let me lead you into your new home."

And the old people followed him up the steps and through the doors, and about the beautiful rooms with their marble floors.

"Here shall you live, good Baucis and Philemon," said Jupiter. "And if there is any one thing that you want very much, just ask me, and I will give it to you."

Baucis and Philemon looked at each other. There was no need for them to talk it over, for they had often amused themselves by trying to think what they would say if they ever had a chance to ask for anything they wanted, and they had always decided on the same thing.

"O kind and wonderful Jupiter," answered Philemon, "all we ask is that we may die at the same time. Don't let one of us live after the other is dead."

"It shall be," replied Jupiter. And then, followed by Mercury, he left them, not taking the road around the lake, but walking right across the water on the silver road which the moon made.

For years Baucis and Philemon lived in their beautiful house, and very happy they were, because they always had enough food to set before hungry

people, and plenty of beds where the tired might rest. And you can imagine that they never grew weary of telling their visitors of the wonderful things the king of the gods had done for them, for they never became forgetful or ungrateful.

One day they were standing at their door, one on each side, talking about the goodness of the gods. They thought that all the wonderful things were over, but as they looked at each other, they saw that another very strange thing was coming to pass. They were turning into trees! Their hair turned to leaves, their arms to great branches, and the bark grew about their bodies.

"Dear Baucis," said Philemon, and "Dear Philemon," said Baucis; and then together they said,

"Farewell!"

Tust as they said it, the bark closed over their mouths, so that they never spoke again. But they grew before the house for many years, and were still good to travelers; for they threw a broad, cool shade which was very pleasant to rest in on hot days. And those who knew the story of the two beautiful trees used to fancy that the trees enjoyed giving pleasure, and used to imagine that they heard the leaves saying, just as the two kind old people had always said:

"Welcome, stranger! Come in! Come in! Rest and refresh yourself."

The Discontented Stonecutter

Once upon a time there was a man who worked from early morning till late at night, cutting building stones out of the solid rock. His pay was small and hardly enough to keep his wife and children from starving. So the poor stonecutter grew discontented, and sighed and moaned bitterly over his hard lot.

One day, when his work seemed harder than usual and his troubles more than he could bear, he cried

out in despair:
"Oh, I wish I could be rich and lie at ease on a

soft couch with a curtain of red silk!"

Just then a beautiful fairy floated down from heaven, and softly said, "Thy wish is granted thee." So the poor stonecutter found himself rich and powerful, and resting easily on his silken couch with its red curtain. As he gazed out, however, he saw the king of the country ride by with many horsemen before and behind him, and with a great golden sunshade held over his head. It irritated the rich man to have no parasol over his head and to see another more powerful than himself, and in his discontentment he exclaimed, "Would that I were a king such as that

Once again his good fairy appeared, waved his wand, and said, "It shall be as thou desirest." Immediately, the man was king, and before him and behind him rode his men-at-arms, and over his head was a golden sunshade. But elsewhere the sun shone fiercely down and dried up the vegetation with its terrible heat. It was reflected into the face of the king, so that even the golden sunshade did not keep him from suffering. Once more he sighed discontentedly, "If I could only be the sun!"

Almost before he spoke, he found himself to be the sun, and he began joyously to send his fiery rays above, below, and everywhere round about him. He scorched the grass of the earth, and burned the faces of its rulers, and felt his power unlimited, until a little cloud placed itself between him and the earth and threw back his scorching rays. It still angered him to find something more powerful than himself, and he wished aloud that he might be a cloud.

Again his wish was granted, and he found himself floating where he wished, through the sky. He ran between the sun and the earth, and sheltered the latter so that the grass grew green, the trees leaved out again, and everything rejoiced in a new growth. Then he sent great floods of rain upon the earth, filled the rivers till they overflowed, swept homes and herds into the sea, and destroyed the works of man in every direction. But try as he would, he could not move one great rock that stood right across his way. Though he sent waters that roared around its base and pushed hard against it, yet it remained immovable. Such a failure angered the man-cloud, and again he cried out, "Would that I were a rock, so strong and immovable is it."

This time, also, his guardian angel interfered, and he found himself a rock that withstood the sun, the wind, and the waters. But then, one day, there came along a rude stonecutter, who with chisel and heavy hammer began to cut the great rock into "What does this small, regular building stones. "What does this mean?" cried the rock. "Has this man power to cut me in pieces? Surely I am weaker than he!

Would I were a stonecutter!"

'As thou wishest, so shall it be," said his guardian angel, and immediately he was again a stonecutter, working hard as before and for small wages, but happy and contented with his lot.

The Constant Tin Soldier

There were once five-and-twenty tin soldiers; they were all brothers, for they had all been born of one old tin spoon. They shouldered their tin muskets and looked straight before them; their uniform was red and blue, and very splendid. The first thing they had heard in the world, when the lid was taken off the box, had been the words "Tin soldiers!" These words were uttered by a little boy clapping his hands. The soldiers had been given to him, for it was his birthday; and now he put them upon the table. Each soldier was exactly like the rest; but one of them had been cast last of all, and there had not been enough tin to finish him, but he stood as firmly upon his one leg as the others on their two; and it was just this soldier who became remarkable.

On the table on which they had been placed stood many other playthings, but the toy that attracted most attention was a neat castle of cardboard. Through the little windows one could see straight into the hall. Before the castle some little trees were placed round a little looking glass, which was to represent a clear lake. Waxen swans swam on this lake and were mirrored in it. This was all very pretty; but the prettiest of all was a little Lady who stood at the open door of the castle; she was also cut out of paper, but she had a dress of the clearest gauze, and a little narrow blue ribbon over her shoulders that looked like a scarf; and in the middle of this ribbon was a shining tinsel rose as big as her whole face. The little Lady stretched out both her arms, for she was a dancer, and then she lifted one leg so high that the Tin Soldier could not see it at all and thought that, like himself, she had but one leg.

"That would be the wife for me," thought he; "but she is very grand. She lives in a castle, and I have only a box, and there are five-and-twenty of us in that. It is no place for her. But I must try to make acquaintance with her."

And then he lay down at full length behind a snuffbox which was on the table; there he could easily watch the dainty little Lady, who continued to stand on one leg without losing her balance.

When the evening came, all the other tin soldiers were put into their box, and the people in the house went to bed. Now the toys began to play at "visiting" and at "war," and "giving balls." The tin soldiers rattled in their box, for they wanted to join, but could not lift the lid. The Nut-cracker threw somersaults, and the Pencil amused itself on the table; there was so much noise that the Canary woke up and began to speak, too, and even in verse. The only two who did not stir from their places were the Tin Soldier and the Dancing Lady; she stood straight up on the point of one of her toes and stretched out both her arms; and he was just as enduring on his one leg; and he never turned his eyes away from her.

Now the clock struck twelve—and, bounce!—the lid flew off the snuffbox; but there was not snuff in it, but a little black Goblin; you see, it was a trick.

in it, but a little black Goblin; you see, it was a trick.
"Tin Soldier," said the Goblin, "don't stare at
things that don't concern you."

But the Tin Soldier pretended not to hear him. "Just you wait till to-morrow!" said the Goblin.

But when the morning came, and the children got up, the Tin Soldier was placed in the window; and whether it was the Goblin or the draught that did it, all at once the window flew open, and the Soldier fell head over heels out of the third story. That was a terrible passage! He put his leg straight up and struck with his helmet downward, and his bayonet between the paving stones.

The servant maid and the little boy came down directly to look for him, but, though they almost trod upon him, they could not see him. If the Soldier had cried out, "Here I am!" they would have found him; but he did not think it fitting to call out loudly, because he was in uniform.

Now it began to rain; the drops soon fell thicker, and at last it came down in a complete stream. When

the rain was past, two street boys came by.
"Just look!" said one of them. "There lies a tin
soldier. He must come out and ride in the boat."

And they made a boat out of a newspaper and put the Tin Soldier in the middle of it; and so he sailed down the gutter, and the two boys ran beside him and clapped their hands. Goodness preserve us! how the waves rose in that gutter and how fast the stream ran! But then it had been a heavy rain. The paper boat rocked up and down, and sometimes turned round so rapidly that the Tin Soldier trembled; but he remained firm and never changed countenance, and looked straight before him and shouldered his musket.

All at once the boat went into a long drain, and it became as dark as if he had been in his box.

"Where am I going now?" he thought. "Yes, yes; that's the Goblin's fault. Ah! if the little Lady only sat here with me in the boat, it might be twice as dark for what I should care."

Suddenly there came a great Water Rat, which lived under the drain.

"Have you a passport?" said the Rat. "Give me your passport."

But the Tin Soldier kept silence and only held his musket tighter than ever.

The boat went on, but the Rat came after it. Hul how he gnashed his teeth and called out to the bits of straw and wood—

"Hold him! hold him! He hasn't paid toll; he hasn't shown his passport!"

But the stream became stronger and stronger. The Tin Soldier could see the bright daylight where the arch ended; but he heard a roaring noise, which might well frighten a bolder man. Only think—just where the tunnel ended the drain ran into a great canal; and for him that would have been as dangerous as for us to be carried down a great waterfall.

Now he was already so near it that he could not stop. The boat was carried out, the poor Tin Soldier stiffening himself as much as he could, and no one could say that he moved an eyelid. The boat whirled round three or four times, and was full of water to the very edge; it must sink. The Tin Soldier stood up to his neck in water, and the boat sank deeper and deeper, and the paper was loosened more and more; and now the water closed over the Soldier's head. Then he thought of the pretty little Dancer, and how he should never see her again; and it sounded in the Soldier's ears:

Farewell, farewell, thou warrior brave; Die shalt thou this day.

And now the paper parted and the Tin Soldier fell out; but at that moment he was snapped up by a great fish.

Oh, how dark it was in that fish's body! It was darker yet than in the drain tunnel; and then it was very narrow, too. But the Tin Soldier remained unmoved and lay at full length, shouldering his musket.

The fish swam to and fro; he made the most wonderful movements and then became quite still. At last something flashed through him like lightning. The daylight shone quite clear, and a voice said aloud, "The Tin Soldier!" The fish had been caught, carried to market, bought, and taken into the kitchen, where the cook cut him open with a large knife. She seized the Soldier round the body with both her hands and carried him into the room, where all were anxious to see the remarkable man who had traveled about in the inside of a fish; but the Tin Soldier was not at all proud. They placed him on the table, and there-no! What curious things may happen in the world! The Tin Soldier was in the very room in which he had been before! He saw the same children, and the same toys stood upon the table; and there was the pretty castle with the graceful little Dancer. She was still balancing herself on one leg, and held the other extended in the air. She was faithful, too. That moved the Tin Soldier; he was very near weeping tin tears, but that would not have been proper. He looked at her, but they said nothing to each other.

Then one of the little boys took the Tin Soldier and flung him into the stove. He had no reason for doing this. It must have been the fault of the Goblin in the snuffbox.

The Tin Soldier stood there quite illuminated, and felt a heat that was terrible, but whether this heat proceeded from the real fire or from love, he did not know. The colors had quite gone off from him; but whether that had happened on the journey or had been caused by grief, no one could say. He looked at the little Lady, she looked at him, and he felt that he was melting; but he stood firm, shouldering his musket. Then suddenly the door flew open, and the draught of air caught the Dancer, and she flew like a sylph just into the stove to the Tin Soldier. and flashed up in a flame and then was gone! Then

the Tin Soldier melted down into a lump, and when the servant maid took the ashes out next day, she found him in the shape of a little tin heart. But of the Dancer nothing remained but the tinsel rose, and that was burned as black as a coal.

Five Out of One Shell

There were five peas in one shell; they were green, and the pod was green, and so they thought all the world was green; and that was just as it should be! The shell grew, and the peas grew; they accommodated themselves to circumstances, sitting all in a row. The sun shone without and warmed the husk, and the rain made it clear and transparent; it was mild and agreeable in the bright day and in the dark night, just as it should be, and the peas as they sat there became bigger and bigger, and more and more thoughtful, for something they must do.

"Are we to sit here everlastingly?" asked one. "I'm afraid we shall become hard by long sitting. It seems to me there must be something outside;

I have a kind of inkling of it."

And the weeks went by. The peas became yellow, and the pod also.

"All the world's turning yellow," said they; and

they had a right to say it.

Suddenly they felt a tug at the shell. The shell was torn off, passed through human hands, and glided down into the pocket of a jacket in company with other full pods.

"Now we shall soon be opened!" they said; and

that is just what they were waiting for.

'I should like to know who of us will get farthest!" said the smallest of the five. "Yes, now it will soon show itself."

"What is to be will be," said the biggest.
"Crack!" the pod burst, and all the five peas rolled out into the bright sunshine. There they lay in a child's hand. A little boy was clutching them, and said they were fine peas for his peashooter; and he put one in directly and shot it out.

"Now I'm flying out into the wide world. Catch

me if you can!' And he was gone.
"I," said the second, "I shall fly straight into the sun. That's a shell worth looking at, and one that

exactly suits me." And away he went.

"We'll go to sleep wherever we arrive," said the next two, "but we shall roll on all the same." And they certainly rolled and tumbled down on the ground before they got into the peashooter; but they were put in, for all that. "We shall go farthest," said they.
"What is to happen will happen," said the last,

as he was shot forth out of the peashooter; and he flew up against the old board under the garret window just into a crack which was filled up with moss and soft mold; and the moss closed round him; there he lay a prisoner indeed, but not forgotten by provident Nature.

"What is to happen will happen," said he.

Within, in the little garret, lived a poor woman who went out in the day to clean stoves, chop wood small, and to do other hard work of the same kind, for she was strong, and industrious, too. But she always remained poor; and at home in the garret lay her half-grown only daughter, who was very delicate and weak; for a whole year she had kept her bed, and it seemed as if she could neither live nor die.

"She is going to her little sister," the woman said. "I had only the two children, and it was not an easy thing to provide for both, but the good God provided for one of them by taking her home for Himself; now I should be glad to keep the other that was left me; but I suppose they are not to remain separated, and my sick girl will go to her sister in Heaven."

But the sick girl remained where she was. lay quiet and patient all day long, while her mother went to earn money out of doors. It was spring; and early in the morning, just as the mother was about to go to work, the sun shone mildly and pleasantly through the little window and threw its rays across the floor, and the sick girl fixed her eyes on the lowest pane in the window.

"What may that green thing be that looks in at

the window? It is moving in the wind."

And the mother stepped to the window and half opened it. "Oh!" said she, "on my word, that is a little pea which has taken root here and is putting out its little leaves. How can it have got here into the crack? That is a little garden with which you can amuse yourself."

And the sick girl's bed was moved nearer to the window, so that she could always see the growing pea; and the mother went forth to her work.

"Mother, I think I shall get well," said the sick child, in the evening. "The sun shone in upon me to-day delightfully warm. The little pea is prospering famously, and I shall prosper, too, and get up and go out into the warm sunshine.'

"God grant it!" said the mother, but she did not believe it would be; but she took care to prop with a little stick the green plant which had given her daughter the pleasant thoughts of life, so that it might not be broken by the wind; she tied a piece of string to the windowsill and to the upper part of the frame, so that the pea might have something round which it could twine when it shot up; and it did shoot up indeed—one could see how it grew every day.

"Really, here is a flower coming!" said the woman one day; and now she began to cherish the hope that her sick daughter would recover. She remembered that lately the child had spoken much more cheerfully than before, that in the last few days she had risen up in bed of her own accord, and had sat upright, looking with delighted eyes at the little garden in which only one plant grew. A week afterward, the invalid for the first time sat up for a whole hour. Quite happy, she sat there in the warm sunshine; the window was opened, and outside before it stood a pink peablossom fully blown. The sick girl bent down and gently kissed the delicate leaves.

day was like a festival.

"The Heavenly Father Himself has planted that pea and caused it to prosper, to be a joy to you and to me also, my blessed child!" said the glad mother; and she smiled at the flower as if it had been a good angel.

But about the other peas? Why, the one who flew out into the wide world and said, "Catch me if you ' fell into the gutter on the roof and found a home in a pigeon's crop; the two lazy ones got just as far, for they, too, were eaten up by pigeons, and thus, at any rate, they were of some real use; but the fourth, who wanted to go up into the sun, fell into the sink and lay there in the dirty water for weeks and weeks, and swelled prodigiously.

"How beautifully fat I'm growing!" said the Pea. "I shall burst at last; and I don't think any pea can do more than that. I'm the most remarkable of all

the five that were in the shell."

And the Sink said he was right.

But the young girl at the garret window stood there with gleaming eyes, with the roseate hue of

A STATE OF THE STA

health on her cheeks, and folded her thin hands over the peablossom, and thanked Heaven for it.

"I," said the Sink, "stand up for my own pea."

Belling the Cat

Long ago the Mice all came together to talk over what they could do to keep themselves safe from the Cat. They sat around in a great circle under an old wash tub, with a candle for light, and wiggled their whiskers, and blinked their eyes, and looked very wise indeed. Some said, "Let us do this," and others said, "Let us do that"; but at last a young Mouse got up, proudly swished his tail, and looked about as though to say he knew more than all the rest of them put together.

"I have thought of something," said he, "that will be sure to keep us safe from the Cat."

"Tell us what is it, then," squeaked the other Mice.

"You all know," said the young Mouse, "it is because Pussy creeps up on us so very quietly, that she is right upon us before we see her. If we could only plan something which would let us know when she is coming, then we should always have plenty of time to scamper out of her way. Now I say, let us get a small bell and tie it by a ribbon around her neck. Then she will not be able to move at all without jingling the bell. So when we hear the bell tinkle, we shall always know that she is about, and can easily keep out of her reach."

As the young Mouse sat down, very proud of himself, all the others clapped their paws and squeaked: "Just the thing! Just the thing! Big-Whiskers

has told us what we should do!"

They even began talking about whether they should get a silver bell or a brass one, and whether they should use a blue ribbon or a pink one. But at last an old Mouse got slowly up from his seat and said:

"It is all very well what Big-Whiskers has said. What he has thought of would truly be wise, but WHO IS GOING TO PUT THE BELL ON THE CAT?"

The Mice looked at one another; nobody spoke a word. Who indeed would dare go straight up to Pussy and tie the bell about her neck? The old Mouse looked straight at Big-Whiskers, but Big-Whiskers was proud no more. He made himself as small as he could, for he had never, never thought to do such a thing himself. Then the old Mouse said:

"It is all very well to TALK about doing great things, but all that really counts is to DO them."

The City Mouse and the Country Mouse

Two little Mice, who had lived together and played very happily when they were children, became separated as they grew up. One of them moved into a fine house in the city, while the other remained near her old home in the country.

They never quite forgot each other, and one day the City Mouse rambled out into the country and called on her old friend. Naturally, the Country Mouse was delighted at the visit, and she gathered the best of everything she could find for a luncheon.

There were some fine peas, choice bacon, and a little piece of rare old Stilton cheese, all of which seemed very sweet and toothsome to the affectionate hostess when she called the other heartily to come and take part in the good cheer.

From living so long among the rich delicacies of the city, the traveled Mouse had lost her early appetite, and though she nibbled daintily here and there, hoping to please her old friend, yet she never ceased to wonder in her heart how the Country Mouse could take any pleasure in such coarse and ordinary fare.

After dinner, when they sat down to chat over old times, the City Mouse could hold her tongue no longer.

"Really, my dear old friend, I don't see how you possibly can keep so cheerful in such a dismal, dead-and-alive kind of place as this in which you live! Why, I couldn't possibly live here a week! There is no kind of life; there's no society; there's nothing

gay or jolly anywhere to be found.
"You go on from one year's end to another, every day just like the one before it, and just like the one that follows it. What you want to do is to come back to the city with me. Come to-night and see

what a gay and happy life I lead."

The airs and address of the City Mouse had made the Country Mouse a little discontented, so as soon as it came dark, the two started off for the city, where they quickly found the home of the City Mouse, in which, as it happened, a splendid supper had been given, and from which the guests had barely departed for home.

It was no trouble at all for the City Mouse to gather up the whole heap of dainties, which she placed on one corner of the handsome red Turkey carpet. The plain little Country Mouse was dazzled by so much splendor; she had never seen such a table as was now before her. There was not half of the meats that she could tell the names of, and not knowing what they were or how they tasted, she sat there wondering where to begin.

Suddenly a door behind them creaked and opened, and the servant came in with a light. The two Mice ran hastily into a corner and hid themselves behind a hassock till everything was quiet again, when they returned to their meal.

The first mouthful had not been swallowed when the door opened suddenly again, and in dashed a boy—the son of the master of the house—a noisy, rollicking boy, followed by a fierce little Terrier, that ran straight to the spot where the two friends had just been sitting.

Such a thing was really no great surprise to the City Mouse, who had learned to run to her hole very quickly on the slightest alarm. She did not realize, however, that the Country Mouse knew nothing about this, and so had not told her where to go. The only place the latter could find was back of a big sofa, and there she waited in awful fear while the Terrier barked and tore around the room, enraged at the scent of the Mice.

After a while, however, the boy skipped out again, the Terrier followed, and the room became quiet. The City Mouse was out in an instant and ran quickly to the dainties, which still lay undisturbed on the floor, for the dog had eaten his supper before he came in.

"Come, come," said the City Mouse, "come out; the table is all spread, and everything is getting cold! We shan't be disturbed again, or if we are we can run and hide. Come, now; let's eat and be happy!"

"No, no, not for me!" said the Country Mouse. "I shall be off as fast as I can. There is too much excitement in this life for me. I'd rather have a crust out there in the country, with peace and quietness, than all the fine things you have here in the midst of such frights and terrors as I've had in the last hour."

What are you? Are you a city mouse or a country mouse? Do you live in the country, where you can see the beautiful blue sky with the white clouds sailing through it, where you can play on the rich green grass, and smell the sweet flowers all about Or do you live in the dusty, smoky city, with big buildings all around you, where the trees are stunted and the leaves look brown and withered? When you go to school in the morning, do you walk along a neat path on the roadside, among fields rich with growing grain, where you can breathe the pure air and romp in the sunshine? Or do you go to school along hot and dusty pavements, where every time you cross a street you must look sharp and run hard, or be caught by an automobile or a street car?

Sometimes the human mice who live in the country when they are children move into the great city and grow old there. They learn to live in the excitement and to like it, but occasionally, when they sit at home in the evening, they wish they were in the country once more, where the evening breezes would bring them the scent of the apple blossoms, and where at daybreak the birds would waken them from their quiet, peaceful slumber.

Why the Bear Has a Stumpy Tail

One winter's day the Bear met the Fox, who came slinking along with a string of fish he had stolen.

"Hi, stop a minute! Where did you get those from?" demanded the Bear.

"Oh, my Lord Bruin, I've been out fishing and caught them," said the Fox.

So the Bear had a mind to learn to fish, too, and bade the Fox tell him how he was to set about it.

"Oh, it is quite easy," answered the Fox, "and soon learned. You've only got to go apon the ice, and cut a hole and stick your tail down through it, and hold it there as long as you can. You're not to mind if it smarts a little; thei's when the fish bite. The longer you hold it theze, the more fish you'll get; and then all at once out with it, with a cross pull sideways and a strong pull, too."

Well, the Bear did as the Fox said, and though he felt very cold and his tail smarted very much, he kept it a long, long time down in the hole, till at last it was frozen in, though, of course, he did not know that. Then he pulled it out with a strong pull, and it snapped short off, and that's why Bruin goes about with a stumpy tail to this day!

Supplementary List. Spring Stories. Was Her Name? (Richards' Five Minute Stories); Little Ida's Flowers (Andersen); Legend of the Arbutus.

SUMMER STORIES. Rhoecus (adapted from Lowell's poem); King of the Golden River (Ruskin); the story of Joan of Arc; Horatius at the Bridge.

AUTUMN STORIES. The story of Ruth (from the Bible); The First Thanksgiving; the story of Arachne.

WINTER STORIES. Parts of Dickens' Christmas Carol; The Happy Prince (Oscar Wilde); the Christmas story (from the Bible); The Birds' Christmas Carol (Riggs).

Related Subjects. The following articles in these volumes will be helpful in connection with this article on storytelling:

Aladdin Ali Baba Alice's Adventures in Wonderland (under Dodgson, Charles L.)

Arabian Nights Bible (The Bible for Children)

Cinderella Drama (Shakespearean Drama in Schools) Evangeline Fable Fairies Fiction Games and Plays Hiawatha Language Legend

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Literature (Literature for Children; Books for Children) Mother Goose Mythology Novel Rhymes of Childhood Rip Van Winkle Robinson Crusoe Santa Claus

STOSS, shtohs, VEIT (about 1440-1533), a famous sculptor and one of the greatest masters of wood carving Germany has ever produced. Many of the statements made about his life are a matter of doubt, but it is believed that he was born and educated at Nuremberg; it is known that he practiced his great art alternately in that city and in Cracow, Poland. Most of his creations are religious in character. and they show a depth of spiritual understanding rare among artists of his time. Stoss's works may be seen in cathedrals and public buildings in various parts of Germany.

Representative Works. Among the most notable of his wood carvings are the high altar in the Church of Saint Mary's, Cracow, and The Angel's Salutation, in the Nuremberg Church of Saint Lawrence. His sculptured stone figures include the red marble Monument of King Casimir IV and three reliefs entitled Last Supper, Christ on the Mount of Olives, and Taking of Christ. The Nuremberg Germanic Museum possesses several examples, including his famous relief Coronation of the Blessed Virgin.

STOUT. See BEER (Kinds).

STOUT INSTITUTE, at Menominee, Wis., the only U.S. institution devoted solely to home economics and industrial teacher training.

STOVE, an apparatus in which fuel is used to generate heat for cooking, for heating water, or for warming a room. The use for which it is intended, and the kind of fuel burned, determine the material, design, and construction of a stove. Iron, cast or sheet, is the most common material in America; in Europe, tile and brick are used, and the stove is built into the house. Gas and electric stoves have many of their parts enameled. The essential features of a stove for heating are an enclosure in which a fire may be built; iron bars, or a grate arrangement, near the bottom, on which the fire rests; provision for admitting air for combustion, through openings below the firepot; and a pipe to carry the smoke to the chimney. Wood was the most common fuel when the first stoves were made, but constant attention was needed to keep the fire burning, and the heat was not even. Coal proved much more satisfactory, and the base-burner stove, which is filled with coal from the top and arranged to feed only a limited amount of fuel at a time, overcame many of the difficulties of the wood stove. Natural gas is a very desirable fuel when it may be obtained cheaply; kerosene, oil, gas, and electricity are used for heating,

and specially designed stoves have been made for these fuels.

The fuel for cook stoves, often called ranges, includes gas, electricity, kerosene, gasoline, coal, and wood. Coal and wood stoves are used when gas or electricity are not available, and, because the former radiate so much heat into the room, kerosene or gasoline stoves are

substituted during the warmer weather. The coal or wood is burned in a fire box; dampers are used to control the air currents through the stove and chimney; and the ashes fall into a drawer-like box. Warming ovens are often built on each side of the stovepipe, about eighteen inches above the cooking surface, and a hotwater reservoir, built to one side or the back, is an added convenience.

Gas and electric stoves are made with three to six burners, on which the cooking vessels may be placed in direct contact with the flame or electric coil, and an oven is placed to one side or below. Improved designs in these stoves have made them effi-

cient and easy to care for and manage; with such a stove, it is possible for the modern housekeeper to prepare an elaborate meal before the fire in a coal or wood stove could get hot enough for cooking.

Stoves were used for heating in Alsace some years before America was discovered, and in 1742 Benjamin Franklin invented his Pennsylvania fireplace, or Franklin stove, which was a marked improvement over the open fireplace. Cooking stoves came later, and in 1798 the first one used in the United States was invented.

Related Subjects. The reader is referred in these volumes to the following articles:

Gas Electric Heating

Heating and Ventilation Fireless Cooker

STOWE, HARRIET ELIZABETH BEECHER (1811-1896), an American novelist, remembered

chiefly as the author of Uncle Tom's Cabin. She was the sister of Henry Ward Beecher, and was born and educated at Litchfield, Conn. Her family moved first to Boston and then to Cincinnati, where her father was made president of the newly established Lane Theological Seminary; and in 1836 Harriet was married to Professor Calvin E. Stowe, of that institu-

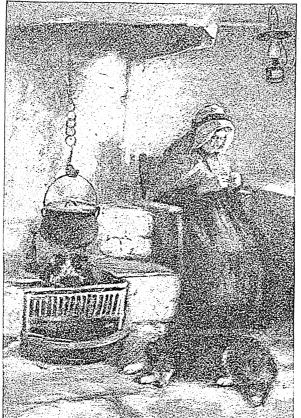
tion. The Ohio River was the dividing line be-tween free and slave soil, and she must have seen many slaves escaping to freedom, perhaps at times even aiding in their escape. She visited homes in Kentucky, also, where she witnessed some of the scenes described in Uncle Tom's Cabin. In 1850 Professor Stowe and his wife moved to Brunswick, Me., and later to Andover, Mass. After her husband's death, in 1886, Mrs. Stowe lived in Hartford, Conn.

IN MEDICAL STATES OF THE STATE

Estimate of Her Work. Mrs. Stowe, because of her famous novel published in 1852, is one of the small number of writers whose productions are so completely a part of the political development of the United States

as to make it difficult to judge their work as literature. Her masterpiece was written from an impulse to show the Northern states the real nature of slavery, and, naturally, it is strongly partisan. It does not fail, however, to reveal the pleasant side of slave life. Since it was written under pressure, in order to keep up with its publication as a serial, it has the faults which belong to all hasty work, but it is, nevertheless, a great book, because of its vivid narrative and excellent character drawing. That it is remarkably dramatic in its nature is shown by its continued popularity as a play. Uncle Tom's Cabin was translated into at least twenty-three languages, and it is not too much to say that it has had not only a wider saie than any other work by an American novelist, but was farther reaching in its effects than any other piece of fiction ever written.

Of Mrs. Stowe's other works, the best are The Minister's Wooing and Oldtown Folks, really charming sketches of New England life. Dred is a novel of



AN EARLY FORM OF STOVE

slave life which never became very popular, and A Dog's Mission and Little Pussy Willow are stories for children.

STRABISMUS, strah biz' mus. See SQUINT.

STRABO, stra' bo (about 64 B.C.—about A.D. 21), a celebrated Greek geographer and historian. He was born at Amasia, in Pontus, removed to Rome when he was about thirty-five years of age, and made that city his home for many years. He traveled extensively, however, in Arabia and through Southern



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HARRIET BEECHER STOWE As she appeared at the time of her marriage.

Europe and Northern Africa. It was on these journeys, supplemented by the works of earlier writers on geography, that his great Geography was based. The seventeen books of this work are extant, the first two dealing with physical geography, the next eight with Europe, six with Asia, and one with Africa. This is the most important work on geography that has come down from ancient times; in it is seen an attempt to gather together all the attainable knowledge of the science.

STRACHEY, stra' kih, GILES LYTTON (1880-1932), an English writer, notable for contributing a distinctive type of biography to modern English literature. He was born in London, the son of Lieutenant General Sir Richard Strachey, a distinguished adminis-trator in India. He was educated at Trinity College, Cambridge, and in his student days showed a decided aptitude for writing. Copies of the undergraduate magazines of his day contain poems of his that far surpass the usual student productions.

Strachey's first book, Landmarks in French Literature, appeared in 1912. It was admirably written, and showed a taste for the classics. His real fame, however, began in 1918 with the publication of his Eminent Victorians. This book was considered revolutionary, because the author's attitude toward his subjects was impartial rather than partisan-he placed no whitewash on the heroic figures of the Victorian Era. Yet, in spite of this spirit of realism, there was no detraction for its own sake. The boundaries of good taste were never transgressed.

The success of the book was immediate; it set a new standard in biographical writing, and revealed high qualities of wit and learning on the part of the author. The outstanding features of the new biography are that it is essentially dramatic in design, and is written

in the form of the novel, rather than that of history. Dull and ordinary facts are omitted, and significant incidents are emphasized. The characters are treated as human beings, rather than as puppets or lay figures. As a whole, the treatment is both realistic and imaginative. Historical facts are used as a basis, but they are organized according to a well-designed dramatic pattern.

Strachey's succeeding books continued to enhance his reputation, and marked him as a writer of scholarly achievements, discriminating taste, and brilliant style.

His Other Writings. In addition to the two works mentioned above, Strachey published Queen Victoria, Books and Characters, Pope, Elizabeth and Essex, and Portraits in Miniature.

STRADIVARIUS, strad ih va' rih us, or STRADIVARI, strah de vah' re, Antonio (1644-1737), one of the greatest violin-makers of all time. He was born at Cremona, Italy, and early entered the employ of Nicola Amati, a celebrated Cremonese master of violin-making. Not until 1600 did he free himself from the traditions of the Amati school and begin to exhibit a style of his own. From 1700 to 1715, his instruments reached the height of perfection, not only in brilliance of tone and power, but in the excellence of form and wonderful precision with which the minutest detail was executed. He seldom afterward deviated from his standard pattern. The Stradivarii of his later period were made merely under his direction, and they therefore never again reached the standard of perfection of the master's own products, which brought fabulous prices.

At the time of his death, many unfinished instruments were found in his workshop. These were completed by either his sons or his pupils, but bore his name on the printed labels. Unsuspecting purchasers have been deceived into buying instruments having the outward appearance of his violins, but there are very few genuine specimens in existence. See VIOLIN.

STRAFFORD, straf' urd, THOMAS WENT-WORTH, first Earl of (1593-1641), an English statesman, the signing of whose death warrant was one of the greatest blots on the character of Charles I. He was born in London, of an ancient family, and in 1614, 1621, 1624, and 1628, was elected to Parliament.

In the second Parliament of which he was a member, Wentworth stood strongly for the rights of that body, and this spirit of resistance to the aggressions of the king characterized him also in the first Parliament of Charles I. He did not, however, sympathize with the Puritans nor share their intense hostility toward the Crown. In 1627 he was imprisoned for a short time for refusing to pay ship money, a tax the king levied upon persons and communities for the national defense, and in 1628 he advocated the Petition of Right.

Feeling that he could not follow Parliament further in its demands, he accepted from the king, on December 25, 1628, the presidency of the Council of the North; six months before, he had been created Baron Wentworth, and on December 10, Viscount Wentworth. In his dealing with affairs in the north, he showed himself very eager to restore order, and gradually he identified himself more and more thoroughly with the king and became less and less sympathetic toward Parliament. In 1633 he went as lord deputy to Ireland, where, because of his coercion, he came to be cordially hated. However, he usually showed good judgment in a most difficult position.

Returning to England in 1639, he was created Earl of Strafford, and was consulted by the king on all important questions. Presbyterians of Scotland had become troublesome, and Strafford advised the king to make use of Irish troops against them, and to assert his royal prerogative in every possible way. When the Long Parliament met, in November, 1640, it at once determined to impeach Strafford for his administration of Ireland, and the king summoned him to London, promising that he should not suffer "in life, honour, or fortune." Parliament dropped the impeachment, for which there was insufficient evidence, and in May, 1641, passed a bill of attainder, action being hurried by the discovery of a plot of the king's to rescue Strafford by force. The un-fortunate statesman released Charles from his promise, and the king signed the bill on May 10. Two days later, Strafford was executed.

Related Subjects. The events with which Strafford was connected led to the COMMONWEALTH OF ENGLAND (which see). Consult, also, the references there noted.

STRAIGHT UNIVERSITY. See LOUISIANA (Education).

STRAIN, in surgery. See Sprain.

STRAIT OF GIBRALTAR. See GIBRALTAR, subhead

STRAIT OF MAGELLAN. See Magellan, subhead.

STRAIT OF MALACCA, mah lak' ah. See MALACCA, subhead.

STRAIT OF MESSINA, mes e' nah. See Messina, Strait of.

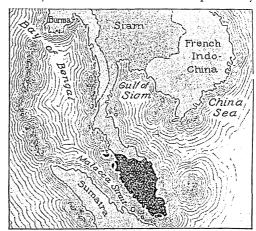
STRAITS OF FLORIDA. See MEXICO,

STRAITS SETTLEMENTS, a British crown colony on and adjacent to the southwestern part of the Malay Peninsula, including the settlements of Singapore, Penang, Malacca, and Labuan. They are named from the straits (Malacca) that separate the peninsula from Sumatra. The colony has a total area of 1,356 square miles and an estimated population of 1,406,120 (1941) including the garrison. There are about 17,300 whites; Asiatic inhabitants are chiefly Chinese, Malays, and natives of India. Cocos Island and Christmas Island were brought un-

der control of the colony in 1886 and 1889, respectively. Both islands were later incorporated with the Settlement of Singapore.

THE STREET STREET, STR

Singapore (which see) is an island less than a mile from the southern end of the peninsula. Penang settlement consists of the island of Penang, sometimes called Prince of Wales Island, off the west coast of the peninsula;



THE FEDERATED AND NON-FEDERATED MALAY STATES The area in black includes the Straits Settlements. a strip of land opposite the mainland (Province Wellesley); and the Dindings, consisting of the small island of Pangkor, off the west coast, and a corresponding strip of mainland territory. Penang is largely a jungle, but fertile and productive where it has been cleared.

Malacca (which see) is on the western coast of the peninsula, between Penang and Singapore. The island of Labuan lies off the northwest coast of Borneo.

World War II came to the Straits Settlements late in 1941, when the Japanese encircled and occupied the British naval base at Penang on December 19. Malacca was captured on January 15, 1942, and by the end of the month the invaders had reached the tip of the Malay Peninsula. Their two southward land drives had been characterized by the infiltration methods that had made them outstanding as jungle fighters. With the fall of Singapore on February 15, the Allies lost the most important anchor of their defense in the Far East. See WORLD WAR II.

STRAMONIUM, strah mo' nih um, a poisonous, ill-smelling weed of the nightshade family, whose seeds and leaves have medicinal value. Other names for it are Jimson weed, devil's trumpet, stinkweed, and thorn apple. It abounds in fields and waste spots, the forked yellowgreen stems often reaching a height of five feet. It bears heavily scented, white, trumpet-shaped flowers, and large, smooth, green, sharp-pointed leaves, from three to eight inches long. Prickly, burlike pods contain tiny,

wrinkled, black seeds, which, like the leaves, are used in making the drug called stramonium. This drug is similar to belladonna (which see) in properties, and is used principally for the relief of asthma. The plant is widely distributed throughout the warmer parts of the world. See Poisonous Plants.

Scientific Name. Stramonium is Datura stramonium of the family Solanaceae.

STRANGLES, a febrile disease of young horses, affects the upper air passages and lymph glands. The cause is a visible germ, the Streptococcus of Schutz. Sore throat and lymphgland abscesses are its main features.

STRANGULATION, in medical practice.

See HERNIA.

STRASBOURG, strahs boor', formerly STRASSBURG, stras' boorK. See France (Interesting Cities)

STRASBOURG CLOCK. See CLOCK, sub-

head.

STRASS. See GEMS (Imitation and Arti-

STRATFORD-ON-AVON, a town in England (population, 11,616, in 1931 census), which is visted by tourists from all over the world. As the birthplace of England's greatest poet— William Shakespeare—Stratford commands an interest out of all proportion to its size. It is in the lovely valley of the River Avon, eight miles southwest of Warwick. The greater portion of the town lies on the west bank of the river, and is typically English, with pleasant streets, shade trees, and old-fashioned houses.

The house in which the poet was born (see illustration in the article Shakespeare) is preserved as a memorial and is open to visitors. Another interesting spot is the chancel of Holy Trinity Church, containing the graves of Shakespeare and his wife, Anne Hathaway. On the slab above the poet's grave, the pilgrim may still read the curious rhymed epitaph beginning-

> Good frend, for Iesus sake forbeare To digg the dust encloased heare.

A Shakespeare Memorial was built on the river bank above the church, and included a theater, a museum, and a library containing valuable books and manuscripts relating to the poet. In 1926 the theater, which had been built in 1879, was burned, though the museum and library were saved. Those interested immediately raised funds to rebuild the theater on a near-by site; the new building seats a thousand people. Annual performances of Shakespearean plays, called summer festivals, have become famous at Stratford. Originally, they lasted only a week, but increased popularity caused the season to be lengthened to ten weeks, and here Shakespearean scholars from all parts of the world gather to see their favorite plays. American tourists, over seven

thousand of whom visit Stratford every year, contributed funds for the erection of a memorial fountain and a clock tower.

At Shottery, a mile west of Stratford, is the quaint thatched cottage where Anne Hathaway lived, while the cottage of Mary Arden, mother of the poet, may be seen at Wilmcote.

Stratford is one of the oldest towns in England, dating, probably, from the Roman era.

Related Subjects. The reader is referred to the article SHAKESPEARE for illustrations of the house in which the dramatist was born, for a drawing of the epitaph referred to above, and for illustrations of the Shakespeare theater and the Anne Hathaway cottage.

STRATHCONA AND MOUNT ROYAL, Donald Alexander Smith, first Baron (1820-1914), a Canadian fur trader, railway-builder, financier, and statesman, whose career is so closely interwoven with Canadian history that he defies classification and stands forth unique

among Canadians of all time. His youth and middle life were devoted to the service of the Hudson's Bay Company and the upbuilding of the Northwest. He was fifty years old when he held his first political office. At sixty he became the chief promoter of the Canadian Pacific Railway, and for nearly a decade devoted himself to the task of financing this great organization. At seventy-six, an age



LORD STRATHCONA

when the average man's race is run, he accepted the office of Canadian High Commissioner to Great Britain, and for nearly a decade more served his country with energy and ability.

With the Hudson's Bay Company. Donald Smith was born at Forres, Morayshire, Scotland, but in 1838 left Scotland for Canada as a junior clerk in the service of the Hudson's Bay Company. For thirteen years he was stationed in Labrador. Leaving Labrador in 1851, he spent the next decade in the Northwest, where he became, in turn, chief trader and chief factor. Ultimately, he became chief commissioner of the company's fur trade. He was elected to the board of directors in 1883, and to the governorship of the company in 1889.

In Politics. In 1870, on the organization of Manitoba as a province, Smith was elected to the Manitoba assembly as a Conservative, and in the next year was appointed commissioner for the Northwest Territories, and was elected for Selkirk (Man.) to the House of Commons. He resigned his seat in the assembly in 1874, as a result of the prohibition of dual representation, but remained in Parliament until 1880. He again sat in the House of Commons as member for Montreal West (he had in the meantime moved from Winnipeg to Montreal), from 1887 to 1896.

The "C. P. R." The interval between these two periods of service in the Dominion Parliament Smith devoted to the Canadian Pacific Railway, which owed its successful completion no less to his vision of the future and his ability as a financier than to the executive capacity of Sir George Stephen and the assistance of Sir John A. Macdonald. For his share in the work, Smith was rewarded with the decoration of the Order of Saint Michael and Saint George, and became Sir Donald Smith.

High Commissioner in London. During his second term of service in the House of Commons, from 1887 to 1896, Sir Donald was a conspicuous member, although he seldom addressed the House. Near the end of the period, when the Conservative party was falling to pieces, there were suggestions that he should assume the leadership of the party, but he declined, and soon was sent to London as High Commissioner. He was raised to the peerage in 1897, as Baron Strathcona and Mount Royal. See Canada (History).

STRATIFICATION. See BED (in geology);

STRATIFIED ROCKS. Sandstone, shale, and sometimes limestone are formed in layers. These layers are called *strata*, and rocks formed in layers are *stratified rocks*. Stratified rocks have been formed of sediments which were first mud and then became hardened into rock. As originally formed, the layers were practically horizontal, but, by folding of the earth's crust, they have, in many places, been thrown out of their former position, and are now in many different positions, from horizontal to vertical. The angle of inclination which these layers form with a horizontal plane is called the *dip*. See DIP; SEDIMENTARY ROCKS. A.J.

STRATOSPHERE, the upper portion of the atmosphere, beginning about six miles above the surface of the earth in high latitudes to nine or more over the equator. This rarefied layer of unknown depth has an almost constant temperature with height, of around -60° F. in polar regions and -90° F. in the tropics. It is sometimes called the *isothermal region*. Clouds of water never form in this belt, and there is practically no convection. Unmanned balloons containing instruments have been sent as high as 100,000 feet in search of information. Albert W. Stevens and Orvil A. Anderson (1935), in a balloon, ascended to a height of 72,395 feet. See Balloon (Balloon Records).

feet. See Balloon (Balloon Records).

STRATUM, stra' tum. See BED (geology).

STRATUS, stra' tus, a kind of cloud (which see).

STRAUS, strous, OSCAR SOLOMON (1850-1926), an American public official who was identified with the diplomatic service, the world-peace movement, and the arbitration of

labor disputes. He was born in Otterberg, in Rhenish Bavaria, Germany, and was the brother of Isidor (a Titanic steamship victim) and Nathan Straus, both well known for their interest in humanity. Oscar Straus was brought to America when he was four years old. He was graduated at Columbia University and Columbia Law School, and later engaged in



MERICALITY OF THE PROPERTY OF

OSCAR S. STRAUS

the department-store business in New York. From 1887 to 1889, and from 1897 to 1900, he represented the United States in Turkey.

In 1902 Straus succeeded Benjamin Harrison as a member of the Permanent Court of Arbitration at The Hague, and was reappointed by Presidents Roosevelt, Taft, and Wilson. President Roosevelt appointed him Secretary of Commerce and Labor in 1906, and in 1909-1910 he returned to Turkey as ambassador. An ardent supporter of progressive principles, he joined the Progressive party in 1912, and made an unsuccessful campaign for the governorship of New York. In 1914 he was chairman of the arbitration commission that settled a wage dispute between the heads of the Eastern railroads and their engineers, and the following year became chairman of the New York State Public Service Commission (first district).

In Literature. Straus was the author of several books, including The Origin of the Republican Form of Government in the United States, Reform in the Consular Service, The Development of Religious Liberty in the United States, The American Spirit, and Under Four Administrations.

STRAUSS, Johann (1825-1899), an Austrian composer, whose beautiful dance compositions won him the title of "waltz king." He was born at Vienna. His father, Johann Strauss, was a well-known composer, the first to elevate dance music, especially the waltz, to an artistic plane, but he was bitterly opposed to the ambition of his son for a musical career. The boy's mother, however, paid for his instruction on the violin. When he was nineteen years of age, he left home to conduct a restaurant orchestra at Hietzing, Austria. There he began to present his own compositions, mainly waltzes, and the restaurant soon became crowded with admiring listeners. In 1849, after his father's death, he united his

own orchestra with that of his father, and began a series of tours of Europe. Everywhere he appeared he received great praise for the

grace and beauty of his original dance music. In 1855 he became conductor of summer concerts in Saint Petersburg (now Leningrad), and from 1863 to 1870 was conductor of the Russian Court balls. His last days were spent in Vienna.

Representative Works. Of Strauss's dance compositions, numbering several hundred, the most noted include Beautiful Blue Danube, Artist's Life, One Thousand and One Nights, and Wine, Women, and Song. He



JOHANN STRAUSS

composed also several successful operettas, among them Indigo, A Nightin Venice, and Prince Methusalem.

STRAUSS, RICHARD (1864-), a German composer, the outstanding exponent of the so-called school of realism in music. He was born in Munich. His father, Franz Strauss, was one of the greatest horn-players of Germany, and at an early age the son showed marvelous musical ability. He was a good pianist at the age of four, a composer of music worthy of

publication at six, and an advanced student of musical theory and composition at ten. Before he was sixteen years old, his songs were becoming well known, and his Symphony in D Minor was being played by several eminent pianists. Even Bülow, who was a merciless critic, praised his work and had his Serenade performed at Meiningen, Germany. In his early manhood, Strauss gained further notice by his numer-



RICHARD STRAUSS

ous compositions for voice and piano, but he had not yet found his true sphere, for he was merely following the tenets of the classical composers.

In 1885 Strauss succeeded Bülow as conductor of the Meiningen orchestra, and at this time came under the influence of the composer Alexander Ritter. The latter induced him to take up the composition of program music, in

which the thought is realistically expressed by the score. Resigning his conductorship, he went to Italy for study and travel, and between 1887 and 1904 produced the great work of his second period, the compositions on which his fame chiefly rests. These include the tone poems Don Juan, Macbeth, Till Eulenspiegel, and Don Quixote; the Domestic Symphony; and the operas Guntram and Feuersnot. Storm after storm of criticism, ridicule, and abuse followed the appearance of these works, for, apparently, the composer broke with the time-honored traditions of music. His theory that music should express realistically the thought of the composition carried him to extremes in some of his later works, but he deserves credit for enlarging the scope of musical forms and for his mastery of orchestration. Throughout his career, Strauss was a master of lyric music; his songs rank with the best.

His chief compositions after 1904 were operatic works. These include the brilliant Salome and Elektra; Der Rosenkavalier, noted for its beautiful orchestral score; Intermezzo; Arabella; and The Silent Woman. Strauss toured the United States in 1921, conducting several orchestras, and using his own compositions. From 1933 to July, 1935, he was president of the Reich Music Chamber and chairman of the League of German Composers.

STRAW, which consists of the dried stems of oats, wheat, rye, barley, and other grains, has a wide range of usefulness. As a coarse feed for livestock, as bedding for animals, and as a material in manure for fertilizing, straw is used in large quantities on farms where there is enough stock to utilize it. In some cases, the remainders from the grain harvest are burned, but this procedure is considered wasteful by all agricultural authorities. Straw has been utilized by some chemical companies in the production of carbon, phenol oil, pitch, and acetic acid, these being extracted by special Straw is also used in the manuprocesses. facture of hats, baskets, saddles, bottle covers, paper, suitcases, and strawboard for mounting and binding.

Wheat straw is the most desirable for hatmaking. The stems are pulled up, as mowing would injure them. When cut into proper lengths, they are bleached in the sun, stripped of the outer layer, bleached again with sulphur, and sorted with regard to size and color. Even though looms have been invented for strawweaving, much of the work is still done by hand, particularly in parts of Europe, Japan, and China. Especially fine work in strawplaiting is done in Tuscany, Italy, where leghorn braids are made from a special kind of straw. Straw-plaiting as a handicraft has practically ceased in the United States. Panama hats are not made of straw, but from the leaf fiber of a species of palm.

2

STRAWBERRY, a luscious red fruit, grown on a plant which is one of the most popular members of the rose family. The plant is a trailing vine whose leaves are borne in clusters of three. One can easily understand why Macaulay exclaimed, on his return from India,

that he would gladly trade all the fruits of the Orient for a single basket of strawberries. Dr. Samuel Johnson is credited with the following: "Doubtless the Creator might have made a better fruit than the strawberryand doubtless also he did not." Just as its relative, the rose, queens it over the rest of the flow-





THE STRAWBERRY

"Doubtless God could have made a better berry, but doubtless God never did" is a sentiment ascribed both to Bishop Whipple and Dr. Boteler, an English physician, as well as Dr. Johnson. The exact phraseology varies.

ers, so the strawberry lords it over the other berries. The domain over which it reigns in America, where it is more extensively cultivated than any other small fruit, stretches from Mexico to Alaska, from New England to the Pacific coast. It is at home in every province of Canada, in Europe, and in South America; and wherever it grows, it is a favorite on account of its delicious flavor, delicate aroma, and rich beauty.

As a matter of fact, the strawberry is not a berry in the technical sense, for it lacks the outer skin, enclosing seeds and pulp, that distinguishes true berries, like currants and huckleberries. It is a fleshy, swollen seed receptacle bearing the dry, yellow seeds upon its pitted outer surface; the star-shaped hull that is re-

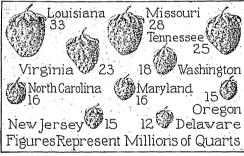
moved before the berry is eaten was, early in the season, the calyx of the blossom. Not every blossom will produce fruit, for some lack stamens and need to be grown in the neighborhood of staminate plants, so that their seeds may be fertilized by the pollen. See Cross-Pollination.

AND THE PROPERTY OF THE PROPER

Cultivation. It is the youngest plants that give the best quality and quantity of fruit, and some growers permit their vines to bear but once or twice. Young plants should always be used in "setting" a bed. Both spring and fall planting are practiced, but if the climate is severe, fall planting necessitates a great deal of attention in the way of covering the bed. Very large and fine fruits are obtained by planting in hills and cutting off the runners, but usually strawberries are set in rows and the runners allowed to mat. In the row the plants are from fifteen to eighteen inches apart, while the rows themselves have three or four feet between them, to allow room for cultivation.

Any good garden soil is suitable for strawberry-growing, but the richer the soil the larger the crop, and fertilization is usually necessary after the first heavy bearing. Rotation of crops is generally practiced by commercial growers. One authority gives this advice:

The strawberry is a cold-blooded plant, and is never at its best in a very warm place. A northern slope is more favorable, other things being equal, than a southern one. Land that has been grass within a year or two is to be avoided, on account of the probable presence of white grubs in it. So, also,



THE STRAWBERRIES OF A YEAR

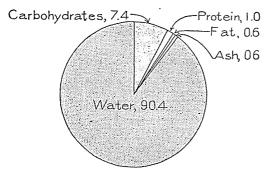
The figures represent the yield in average years in the leading American states.

land that has been in strawberries within a year is liable to contain insect enemies or rust spores. The best results cannot be secured where water stands for weeks within a foot of the surface, during the growing season. People are not generally aware also that large trees near a strawberry bed are very injurious, on account of the water they take from the soil.

The ideal preparation is first to drain and grade the bed, in the fall. Then cover the surface with manure; and in the spring rake off all trash; and then make fine the soil to the depth of six inches. . . . If one has any doubt about the fertility of land, in the spring, just before the plants come into bloom, apply a few hundred pounds of a good fertilizer per acre.

Two hundred pounds of nitrate of soda, when about half the fruit has set, will add to the crop and to the luxuriance of the plants. I am satisfied from long experience that a good coat of manure applied in the winter is one of the best methods to get a good crop of strawberries. Lime should never be used on land for strawberries, nor a very large amount of unleached wood ashes.

Strawberries require a great deal of water, and when the rainfall is insufficient, some form of watering must be resorted to. In a homegarden bed, this can be accomplished by dig-



COMPOSITION OF THE STRAWBERRY

ging holes every two feet in the row, and pouring several quarts of water into each hole. To prevent evaporation, draw a little dry earth over the moistened place. Sprinkling merely moistens the top soil and causes the ground to cake. Moisture can also be conserved by stirring the soil, which causes the top layer to act as a mulch, and prevents escape of moisture from below. Commercial growers resort to irrigation.

Strawberry Enemies. The strawberry is attacked by several insect pests and by various fungous diseases. Among the latter is blight, or rust, which forms small purple spots on the leaves. The strawberry weevil, especially troublesome in the southern states, is a small black beetle that preys on buds and blossoms. The strawberry leaf roller, a small, yellowish caterpillar, attacks the leaves of the plant. (See INSECTICIDES AND FUNGICIDES for remedies and controls).

B.M.D.

Derivation. Cultivated strawberries are derived from three species, or stocks—one from Europe, one from the United States, and one from Chile. The American has the finest flavor; the Chilean gives the largest berries. These are species of the genus Fragaria. The common wild strawberry is F. virginiana.

STRAWBERRY SHRUB. See CALYCANTHUS. STRAWFLOWER. See EVERLASTING FLOWER.

STREATOR, ILL. See ILLINOIS (map).
STREET CALLED STRAIGHT. See DA-MASCUS.

STREET RAILWAY. See ELECTRIC RAILWAY.

STREETS. See ROADS AND STREETS.

STRENGTH OF MATERIALS is a term used by engineers to designate the study of the internal forces in a body, and the changes of shape and size of the body that are produced by the application of external forces (called loads). The internal forces are called *stresses*, and the accompanying changes in dimensions of the body are called deformations or *strains*. There are three types of stress, namely, *tensile* stress, which tends to elongate or stretch a member; *compressive* stress, which tends to shorten a member; and *shearing* stress, which causes the material to slip in layers. *Flexural* or bending loads, and *torsional* or twisting loads, produce combinations of the above-named types of stress.

The resistance of materials to deformation or failure caused by internal stresses (called "mechanical properties") is determined by testing specimens in special machines. In engineering work, standard tests are made to determine such properties as strength, stiffness, hardness, resilience, toughness, and ductility.

Steel, wood, concrete, and cast iron differ greatly in their mechanical properties; their strengths also depend upon the type of stress which is applied, and upon the type of loading.

For small stresses, most materials are elastic. When, however, the material retains a permanent deformation upon removal of the stress, it is said to have reached the "elastic limit."

In the construction of a structure or machine, it is necessary to compute the internal stresses that are developed in each member by the applied loads and to select the material which will best withstand the particular service condition and stresses exerted on the member. In order to combine flexural or torsional strength with lightness, metal members are often cast or built up in hollow form. The strength of a material which is used in estimating stresses for design of a member is often about one half of the elastic strength, if the structure is to be subjected only to static or steady loads while in service. However, if the member is subjected to many millions of repetitions of stress during the normal life of the machine, the design stress is often about one third of the endurance limit of the material, which is the maximum stress that can be developed in the material a very large number of times without fracture.

The numerical values of the strengths of materials can be expressed only approximately because the strength depends upon the chemical composition and heat treatment a material has received. The compressive strength of a material is usually somewhat greater than the tensile strength of the material. Wood, concrete, and cast iron do not have great tensile strength, but are more flexible than steel.

The maximum tensile strength of small pieces of dry wood varies from 3,000 to 10,000 pounds to the square inch, but the strengths are greatly decreased by the presence of moisture in the

wood or by inherent defects such as cracks and knots in structural timbers; wood is much weaker in resisting shearing stresses than in resisting tensile or compressive stresses.

The compressive strength of portland cement concrete usually ranges from 2,000 to 5,000 pounds per square inch, but the strength is greatly influenced by the amount of water and cement used in the original mixture, and increases with the age of the concrete.

APPROXIMATE RANGE OF STRENGTHS OF METALS (in thousands of pounds per square inch)

METALS	ULTIMATE TENSILE STRENGTH	ELASTIC TENSILE STRENGTH	RELATIVE STIFFNESS*	ENDURANCE		
Cast iron, low strength Cast iron,	20- 40		15,000	9		
high strength	40- 60		20,000	20		
Wrought iron	48- 60	25- 35	28,000	25		
Structural steel Carbon steels.	60- 72	33- 43	30,000	30- 40		
heat-treated Alloy steels,	90-200	60-130	30,000	40- 90		
heat-treated	110-280	90-220	30,000	50-100		
Copper, annealed Copper,	30- 45	3- 8		10		
cold drawn.	50-100	35- 70	16,000			
Brass, annealed Brass,	54	20		18		
cold drawn.	60-100	25- 50	14,000	26		
Magnesium alloy (Dow-						
metal J-1).	. 45	30	6,500	18.5		
Duralumin	60	37	10,000	15		

*Values represent the ratio of stress to the corresponding stretch per unit length. T.J.D.

STREPTOCOCCI, strep toh kok' se. See Bacteria and Bacteriology (Kinds).

STRIKE, the action of a body of workers in ceasing work in order to force an employer to grant their demands. It has always been the chief weapon of labor organizations. To prevent others from taking their places, strikers resort to picketing, that is, they take positions outside the factory or other working place, and try to persuade strikebreakers not to work. Of recent years strikers have resorted to sitdown strikes, that is, they sit down inside the plant, and thus make it impossible for anyone else to work. Such strikes were common in France in 1936 and in America in 1937.

When employees leave their work, not because of dissatisfaction with their own condition, but to make their employer bring pressure upon another employer whose laborers have already struck, their act is known as a sympathetic strike. A general strike, such as occurred in England in 1926, is a concerted withdrawal from work by laborers in numerous and diverse trades. The reverse of a strike is the lockout,

by which an employer refuses to permit workers to return until they have submitted to his terms. Joining in a victory pledge in 1942, labor organizations agreed to abstain from strikes during the war period.

E.J.

Related Subjects. The reader is referred to:

Collective Bargaining Eight-Hour Day Injunction Labor Organizations Open Shop Sweatshop System PRINCES OF THE STATE OF THE STA

STRIKE, in geology. See DIP.

STRINDBERG, August (1849-1912), one of the foremost Swedish writers of modern times. His literary output is difficult to classify, because it represents such a variety of interests and so many schools of thought. A man of extraordinary mental energy, he was constantly stimulated by a craving to investi-

gate new intellectual fields. Strindberg was the son of an obscure tradesman of Stockholm. He studied at Upsala University, but left that institution without taking a degree. Thereafter he taught, engaged in newspaper work, tried his skill on the stage, and was otherwise busy. In 1878 his first important play, Master Olof, was produced, after it had been changed to please the theater managers, who had re-



AUGUST STRINDBERG

fused it six years before. The work was of value because it started a revolt against time-honored traditions in Swedish literature. The next year appeared his novel *The Red Room*, which revealed his gift for sarcastic expression of opinion and realistic description.

Once started on his literary career, Strindberg worked with superhuman energy, but for two years (1895-1897) was idle because of a mental breakdown. At various times he was a realist, a romanticist, a skeptic, and a mystic. He was also a zealous advocate of the theory that woman is inferior to man, mentally, physically, and morally.

His Varied Genius. Strindberg's numerous writings, in addition to those named above, include A Fool's Confession (autobiographic in character); The Natives of Hemsö, a novel of Swedish peasant life; Fisher Folk; Utopias Realized, a plea for socialism; Speeches to the Swedish Nation; and the plays Gustavus Adolphus, Father, and Lucky Peter's Travels.

STRINGED INSTRUMENTS. See OR-CHESTRA; MUSICAL INSTRUMENTS.

STRINGER, ARTHUR [JOHN ARBUTHNOTT] (1874-), a novelist and writer of short stories, was born in London, Ont., and was

educated at the universities of Toronto and Oxford (England). His belief that a fluent imagination requires the stimulus of an active life, and his desire for experience of all kinds led him into newspaper-reporting in New York City, from which grew his first volume of short stories, The Loom of Destiny. He was editorial writer for the American Press Association from 1898 to 1901, and literary editor of Success in 1903-1904. Since his first employment in New York, he has lived in the United States.

Several novels were inspired by his travels to far corners of the world, and out of a disastrous venture in fruit-farming, in Western Ontario, and one equally unfortunate in wheatand tobacco-growing, in the Alberta foothills, came a trilogy dealing with ranch life—The Prairie Wife, The Prairie Mother, and The Prairie Child. This series is marked by excellent character portrayal and a sympathetic understanding of the trials of a pioneer family.

Other Writings. Besides the books mentioned, Stringer has written A Study in King Lear, Pauline and Other Poems, The Mud Lark, and numerous mystery stories. See Canadian Literature.

STROBOSCOPE. See Moving Pictures (The Romantic Story of Moving Pictures); Camera.

STRONGBOW, nickname of the Earl of

Pembroke. See IRELAND (History).

STRONTIUM, stron' shih um, first found in the lead mines of Strontian, Argyllshire, Scotland, is a pale-yellow metallic element whose compounds occur in small quantities in rocks, soil, and mineral waters. It is harder than lead; is ductile and malleable, that is, capable of being drawn into a wire and hammered into a sheet; and gives a brilliant crimson flame. Strontium and barium (which see) resemble each other very closely. Strontium hydroxide is used to extract sugar from molasses in the beet-sugar industry. The nitrate is used in fireworks, because it colors a flame crimson. "Red fire" is a mixture of potassium chlorate, shellac, and strontium nitrate. Other compounds are used in medicine. The chemical symbol for strontium is Sr [see Chemistry (The Elements)].

STRUCK COINS. See Numismatics.

STRUCTURALISM. See Psychology (Modern Movements).

STRUGGLE FOR EXISTENCE. See Evo-

LUTION; NATURAL SELECTION.

STRYCHNINE, strik' nin, or strik' neen, a very bitter, poisonous drug with powerful stimulating properties, obtained from the seeds of the nux vomica and kindred plants. In doses one-sixtieth to one-fifteenth grain, it is often prescribed as a tonic; and is given as a stimulant in cases of acute diseases where collapse is imminent, for it increases the flow of digestive juices, directly affects the spinal

cord, and indirectly affects the heart and lungs. One-eighth-grain dose will kill a dog; three times as much causes spasms in man; and one grain is usually fatal. The symptoms—violent twitching, difficulty in swallowing, and convulsions, during which the body is bent backward-appear in about twenty minutes, and death may result in two hours from suffocation or exhaustion. A stomach pump or an emetic should be used at once. So dangerous a drug should never be taken except under the advice of a competent physician.

Related Subjects. The reader is referred in these volumes to the following articles:

Antidote Nux Vomica Alkaloids

STUART, CHARLES EDWARD (1720-1788), called the Young Pretender, Bonnie Prince CHARLIE, and the Young CHEVALIER, was the eldest son of James Edward Stuart and the grandson of the deposed James II of England. He was born in Rome. James Edward, known as the OLD PRETENDER, was the son of James II by his second wife. In 1745 Charles Edward made a determined effort to win back the English throne for the Stuart family. Although he was aided by the Highland clans of Scotland and gained some successes, there was no uprising in England in his favor, and in 1746 his army was defeated at Culloden Moor. prince escaped to France, after many thrilling adventures. His life thereafter was one of dissipation, and was spent chiefly on the Continent. He died in Rome. See STUART, HOUSE

STUART, GILBERT (1755-1828), an American painter of the early national period, whose portraits of Washington are the most famous

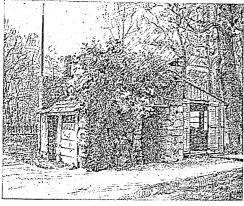
of all likenesses of the first President. Stuart executed at least forty portraits of Washington, the first in 1795. Every one is familiar with the so-called "Athenaeum" head, showing the left side of the face. A fulllength picture-Washington at Dorchester Heights—is also well known. Both of these are in the Boston Museum of Fine Arts. The Metropolitan Museum, in New York, possesses the famous "Gibbs-Channing" portrait. Another of the series



GILBERT STUART

was purchased by popular subscription for the Chicago Art Institute, in 1924.

Stuart was born near Newport, R. I. He began to paint when a boy of thirteen, without any guidance, and though he had begun to accept commissions before 1775, he had little opportunity to study under good masters until that year, when he went to London. Between 1778 and 1782, he lived and worked with Benja-



STUDIO OF GILBERT STUART
It was in this building, near Philadelphia, that he painted many of his Washington portraits.

min West, his countryman. After winning a name in London and Dublin as a fashionable portrait painter, he returned to America, his chief reason for this move being his desire to secure Washington as a sitter.

Stuart painted the first Washington head in Philadelphia. Later, he lived in Washington and in Boston, and he died in the latter city. While in Europe, he painted George III and the future George IV, Louis XVI of France, Sir Joshua Reynolds, Benjamin West, and the famous actress Mrs. Siddons. Among other sitters were the four Presidents following Washington, and John Jay and Jerome and Madame Bonaparte. Stuart's paintings are notable for their purity and delicacy of coloring.

STUART, House of, a royal dynasty of England and Scotland, the members of which in theory and practice were exponents of the principle that "the king can do no wrong." The first Stuart to rule over England was James VI of Scotland, son of Mary, Queen of Scots. In 1603, on the death of Elizabeth, last of the House of Tudor, James ascended the throne of England as James I, thus bringing the two countries under one sovereignty. IIis successor, Charles I, ruled so despotically that he was deposed and beheaded, and a commonwealth was established (1649). In 1660 the family was restored to the throne in the person of Charles II, son of Charles I. In 1685 James II. brother of Charles, became king. He applied the divine-right theory so recklessly that, in 1688, he was deposed by a bloodless revolution, and the crown was bestowed on his daughter Mary and her husband, William of Orange, the two becoming joint rulers of the kingdom. In 1702 Anne, sister of Mary, succeeded to the throne. She was the last Stuart ruler. In her reign, Scotland and England were united. See table, page 6882.

Related Subjects. The reader is referred in these volumes to the following articles:

Anne Charles (I and II, England) Divine Right of Kings Elizabeth James (I and II, England) Mary (II, England) Mary Stuart Scotland Stuart, Charles Edward William (III, England) THE THE PROPERTY OF THE PROPER

STUART, JAMES EWELL BROWN (1833-1864), a dashing cavalry officer in the Confederate service during the War of Secession. He was born in Patrick County, Va., and was graduated in 1854 at West Point. In 1857 his regiment was sent to Kansas to enforce order, and he also saw service against the Cheyenne Indians. He resigned from the Federal army in 1861, when Virginia seceded, and was commissioned lieutenant colonel of Virginia troops, first winning distinction at the

first Battle of Bull Run. He was commissioned major general of cavalry in 1862, and during the Battle of Antietam made a raid into Pennsylvania. He aided Stonewall Jackson at Chancellorsville, and commanded that general's corps temporarily, after Jackson's tragic death. In the Wilderness campaign, Stuart was successful in several engagements. He was



J. E. B. STUART

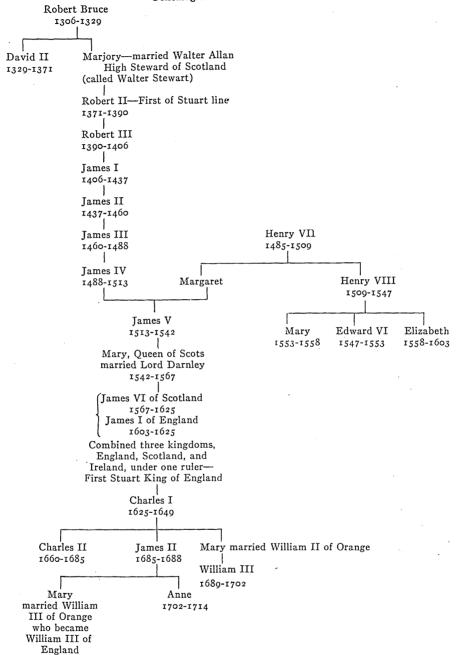
mortally wounded at Yellow Tavern in 1864, in attempting to check the advance of Sheridan against Richmond. See WAR OF SECESSION.

STUCCO, stuk' o, a term applied to various compounds used for interior decorating and as a surfacing for the exterior of buildings. That used for inside decorating is a fine plaster composed of gypsum and glue water or of pulverized white marble and fine sand, gypsum, and water. It lends itself readily to polishing and finishing, and gives beautiful effects. Imitation marble is a form of stucco. Stucco was employed quite generally as a decorative medium by the Greeks and Romans, who often shaped it, while plastic, to form designs in relief.

Exterior stucco is much coarser, and contains a considerable amount of cement. It is now used extensively as a surfacing material for modern houses. It is durable and attractive, and costs less than stone. See Staff.

STUCK, HUDSON (1863-1920), American clergyman, the first white man to reach the summit of Mount McKinley. For this he was made a fellow of the Royal Geographical Society. See McKinley, Mount; Temperature.

6882 Genealogical Table of the Stuarts



STUNDE, the Swiss mile. See MILE.

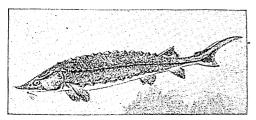
STURGEON, stur' jun, the common name of a family of large fish inhabiting fresh waters and seas of the North Temperate Zone. They are caught for their flesh, which is usually smoked, and for their eggs, which are used in the preparation of caviar (which see). From the bladder of the Russian sturgeon a superior quality of isinglass is obtained. These fish

have slender, elongated bodies covered with rows of bony plates. There is a long snout, beneath which is a small, toothless mouth with thick, sucking lips. There are four barbels in front of the mouth. The head, like the body, is well protected with plates. A single dorsal fin grows on the back, and the tail is forked, the lower lobe usually being shorter than the upper. Most of these fish migrate

THE STATE OF THE PROPERTY OF T

from salt water into streams in the spawning season, though some species are permanent denizens of fresh waters. Their food, consisting of small marine animals and plant life, is sucked into the mouth.

One of the best-known species is the *common* sturgeon, found in European waters and along the American coast from Maine to South Caro-



THE STURGEON

lina. The largest specimens are ten feet long and weigh as much as 500 pounds. Other species include the white sturgeon, of the American Pacific coast, the largest American fish of this group; the lake sturgeon, a denizen of the Great Lakes and of the Mississippi Valley waters; and the great Russian behuga, which sometimes reaches a weight of 3,000 pounds. This fish has furnished the greater part of European caviar. Another Russian sturgeon, the small sterlet, is also the source of this delicacy. The North American sturgeons are rapidly diminishing, because of indiscriminate fishing.

Scientific Names. The common, white, and lake sturgeons are, respectively, species sturio, transmontanus, and rubicundus of the genus Acipenser. The beluga is A. huso; the sterlet, A. ruthenus.

STURGEON, WILLIAM. See ELECTRO-MAGNET.

STURGEON RIVER, located on the upper peninsula of Michigan.

STUTTERING. See STAMMERING AND STUTTERING.

STUTTGART, shtoot' gahrt. See GERMANY (Principal Cities).

STUYVESANT, sti' ve sant, PETER or PETRUS (1592-1672), the last Dutch governor of colonial New York, or New Netherland, as it was then called, was born in Holland. The exact place of his birth is not known, nor are any facts about his youth and education to be obtained. It is certain that he served as a soldier in the West Indies, and at the age of forty-two was director or governor of one of the colonies founded on those islands by the Dutch West India Company. In 1644 he lost a leg while leading the Dutch against the Portuguese on the island of Saint Martin, and the company, as a reward, made him governor of New Netherland.

He arrived at New York in May, 1647, and mmediately began to make enemies by his

arbitrary methods. Undoubtedly, however, he restored order and business confidence and quieted the Indians, who had been treated without mercy by the previous governor, William Kieft. In 1650 he settled with the New England colonists the northern boundaries of the Dutch colony, and further aroused the wrath of his subjects by granting too much territory to the Puritans. Five years later, he captured all of New Sweden, including the present state of Delaware, and made it a part of New Netherland.

Stuyvesant was unbending, and had unbounded confidence in himself. When, in 1653, a convention of Long Island citizens demanded a share in the government, he replied: "We derive our authority from God and the Company, and not from a few ignorant subjects."





PETER STUYVESANT

From an engraving after the painting by Van Dyck. The original is owned by the Stuyvesant family, New York City.

In 1664 an English fleet ordered the surrender of the city, and, after resisting a few days, Stuyvesant yielded, on September 8. He afterward settled down on his farm, or bouwerij, part of which is now known as the Bowery, in New York City. He died on this estate, and lies buried on the site of Saint Mark's Church. The beautifully carved and inscribed stone which covered his grave is built into the wall

6884

of the church. Irving's Knickerbocker History of New York gave Stuyvesant lasting fame.

STYLE. See Flowers (Pistil).

STYLITES, sti li' teez, SIMEON (390-459), the famous Pillar Saint. He was so called because he spent thirty years of his austere life atop a column, eating but once a week and performing miracles of endurance and piety. See also Monasticism.

STYLUS. See PEN; CUNEIFORM INSCRIP-

STYRIA, steer' ih ah, a province of Austria-Hungary before 1918, then a division of Austria until its seizure by Germany in 1938. See

Austria.

STYX, stiks, in Greek and Roman mythology, the dreary and pestilential river that flowed seven times around Hades, the abode of the dead. Across it the departed spirits were rowed by the ferryman Charon, to the realms of Pluto, who assigned them either to Elysium (Elysian Fields) or to the grim regions of Tartarus. A lofty waterfall in Arcadia was also known as the Styx. Its waters were supposed to be poisonous, and its barren surroundings suggested the entrance to the lower

Related Subjects. Information additional to the above will be found in the following articles:

Charon

Elvsium

Tartarus

SUBANSIRI RIVER. See Brahmaputra

SUBCLAVIAN, sub kla' vih an, ARTERY

AND VEIN. See Blood, color plate. SUBCONSCIOUS, sub kon' shus, About the term subconscious center many important phases of mental conduct. The realm of the subconscious includes the many motives, feelings, and impulses that affect behavior without reaching full consciousness; it emphasizes the significance of a variety of the mind's occupations without which human nature, normal and abnormal, cannot be understood. Consciousness has arisen because it is necessary for certain higher types of reaction. If rightly disposed, it is most helpful; if wrongly applied, it becomes harmful. Consider physiological functions: We have just as much awareness as is good, and no more. We attend just enough to the sensations accompanying eating to swallow our food; if we put too much attention upon swallowing, it suffers—hence the difficulty in swallowing a pill. We walk best when we walk naturally; one does not walk naturally (which means with a right distribution of consciousness) when coming in late at church or theater, with the eyes of the assembly upon one. The stiff expression so often seen in photographs reflects the consciousness of having one's picture taken.

All this illustrates the delicate relation between consciousness and conduct. Overconsciousness of one's digestion makes the nervous

dyspeptic; but the complex varieties of consciousness depend upon social training. free "unconsciousness" of childhood gives way to increasing experience. The age of self-consciousness is physiologically determined; the shyness of young men in the presence of young women is deeply regulated by all the complicated reactions of sex.

Most of our acquired habits are given over to subconscious guidance. It is common to remark that, without observing, we cannot tell how we dress, how we know where to reach for the knob of a door, how we manipulate a typewriter or a sewing machine. Yet, at one stage of learning, all these actions were slow, deliberate, and conscious. It is equally common to observe that these mechanisms, on occasion, run themselves. When a man upon touching his watch, in dressing for the evening, begins to wind it and then to undress and go to bed, we call the lapse a case of absent-mindedness, and say that he does this un(sub)consciously. When we mislay an article, and try to think how and when we disposed of it, we are trying consciously to follow the clue of our subconscious responses. Such states are characteristic in that they show a division of attention. While dominantly attentive to one action, we carry on another inattentively. In extreme absentmindedness, sensations do not yield their normal report, and actions are performed without normal awareness of their regulation. The man who carried a closed umbrella under his arm in a rainstorm, because he was convinced that he forgot the article when he left home, ignored the sensations that, in a normal state of consciousness, he would have received from the umbrella; and yet he maintained the contractions of the arm muscles necessary to hold the umbrella; these also were defectively perceived.

Absent-mindedness is a state of dissociation, slight or deep; at the slightest, it gives rise to confusion due to lax attention, such as the instance of the young lady in the train who was eating a banana when the conductor collected tickets, and threw her ticket out of the window, while offering the conductor the banana peel. In more severe dissociations, it approaches a dream state or a trance. It appears spontaneously in sleepwalking; the sleeper is attentive to the line of action upon which he is bent, but inattentive to all else. To awaken him means to restore him to normal consciousness. It appears still more strikingly in hypnosis (see Hypnotism), in which the range of consciousness can be definitely controlled by suggestion. The hypnotized subject sees, hears, and feels only what is related to the action suggested; his state is abnormal in that he ignores obviously present objects if it be suggested that they have disappeared. Upon awakening, he may have no recollection of anything done

in the hypnotic state.

Throughout this range of observations, it is to be noted that subconscious processes are at They are at work constantly to facilitate habits; in speaking in public, we focus the attention upon the ideas we wish to express, and the subconscious mechanisms take care of the formation of the words and their utterance. Some persons talk in their sleep, so subconscious has the regulation become. Though concentrated upon one central task, we are giving fractions of attention to our surroundings, to our bodily condition, to the engagements ahead, and to the routine of daily life. The relations become more interesting in the unusual cases, such as automatic writing or crystal-gazing. In the latter case, the subject supports and clarifies the subconscious impressions, bringing to the surface what commonly is vague and near the edge of forgetfulness. Every mind is stored with vast accumulations of impressions which cannot be consciously commanded, but which none the less contribute to the imagery, the ideas, the memories, that guide thought. The crystal-gazer, also the hypnotized subject, can "tap the subconscious," as it were, more fruitfully, and thus raise the impressions to a conscious value.

The subconscious plays its part in the field of sensation, in the field of memory, and in the organization of knowledge, but even more strikingly in the field of action. The subconscious there becomes the subvoluntary; or, more simply, some irregularity of action and report enters. When one finds, on attempting to wind his watch, that he has already wound it, or, on reaching the house door at night to lock it, that he has already locked it, the action and intention failed to be registered as usual. When persons are assembled about a table with their hands resting on it, and solemnly maintain that no one exerted the slightest pressure, yet the table moved violently and even rose in the air, the actual contractions of their muscles are ignored. (They are ignored through the conviction—which acts as a powerful suggestion—that some outside force is responsible for the movement.)

Prejudice blinds to virtues and failings alike; it selects what it shall see; it also ignores movements and intentions. In a more subtle manner, the same procedure determines mind reading (which see), which is really muscle reading. But the movements of the table through the subconscious (ignored) contractions of the hands that rest upon it lack any intellectual expression; they proceed upon a powerful emotional interest. When, however, the hand is laid upon a small tripod and moves from letter to letter over an alphabet (ouija board), and thus spells messages in consecutive sentences (while still the sitter claims ignorance of intention or selection of movement), the performance has a more intricate meaning.

For the ideas which guide the movements are also subconsciously inspired and regulated. If the instrument holds a pencil and writes (planchette), the messages are more fluent, while in automatic writing, the hand itself may write elaborate compositions, seemingly without the full conscious direction of the writer. In all these cases, the subconscious is the source of idea and expression.

MANAGEMENTALIS

Cases of this kind have always attracted attention. The most recent is that of "Patience Worth," which is a ouija-board revelation. Poems, prose narratives, dialogues of an elaborate character, with distinct literary merit and a quaint phraseology, are recorded, and fill a volume of subconscious automatic production. The writer is unaware of the source of the ideas which are "incubated" and reach expression in this roundabout manner. They are ascribed to a foreign agency, and in most cases have reference to spirit origin (see Spiritual-ISM). Equally striking is the automatic and dramatic action in a trancelike state. The most remarkable of these likewise requires a volume for its record. The subject develops several cycles of impersonation. In one she is an Indian princess; in another an inhabitant of the planet Mars; in a third the reincarnation of Marie Antoinette. As a Martian she develops a language (founded upon French, which alone she knows) and describes the life The interpretations are made on Mars. through a "medium" (also personified) who is really the means by which the subconscious communicates to the conscious self. Upon awakening from this trance, the subject is unaware of the drama that she has enacted.

It is suggestive that in such instances the subconscious, detached procedures do not affect the conduct of waking life. When this occurs, the normal life is disturbed, and we have cases of divided personality. One state with one set of memories, of tastes and inclinations, of desires and habits, is now in the ascendant; and again it falls away, and another person with quite opposite character takes her place. Such is hysterical instability. The one state is in ignorance of what the other does; but it can be definitely established that the relation of the two states is such that what is conscious to the one is subconscious to the other. An avenue of communication may be found; and when the two "characters" may be reconciled and merged, a cure takes place. The extreme to which states of conflict may be carried are almost incredible; but such instances cannot be summarized.

Cases of a different type are those, reported from time to time, in which a sudden lapse of personality ensues, and a man wanders from home, is unaware of his previous life, settles in a new region, possibly in the same occupation as he formerly exercised, or it may be in a

very different occupation; then suddenly comes to himself, unfamiliar with his new surroundings and oblivious of his recent life. Such divisions of the personality—between functions retained and those lost—may afford a clue to the nature of the defect, but as frequently leave unexplained the exact injury that the brain has suffered. It is established that the set of memories in abeyance is really subconsciously retained; the two states react much in the manner of alternating personalities, in cases of incomplete fusion.

Normal characters represent a useful support and relation of conscious and subconscious factors; abnormal characters represent the failure of such relation. Typically, these result from conflict; and such conflict-motives have prompted the view of Freud and others that the subconscious is constantly seeking and achieving expression as unfulfilled wishes and incomplete repressions. It is held that a dream is such a procedure. It has one meaning at its surface in the incidents of the dream; and another, deeper and latent, in terms of desires that are suppressed and reach expression in disguise by the dream route, when the

conscious censor is asleep.

Every one harbors secret wishes, private hopes, imaginative ambitions-many of them suppressed by social training and the harsh conditions of existence—which form phases of character in conflict with the conscious life that commands. Hysterical cases of divided personality and inconsistency are but exaggerated and irregular instances of the same relation. Freud believes also that the lapses of absent-mindedness express a suppressed intention. The value of his theory lies largely in the search for such inner conflict which it has aroused in cases of nervous and mental trouble; for when once the subconscious source of irritation is found and made conscious, the conflict disappears. The use of the analyses of dreams and other mental states to determine the hidden source of conflict is called psychoanalysis. In a large number of cases, the conflicts center about the life of sex, because this is at once a most powerful emotional realm, and one concerning which society imposes rigid repressions.

However viewed, the realm of the subconscious—especially for the emotional life, but hardly less so for the intellectual—is of large significance for the understanding of mental behavior. Both in its supports and in its conflicts, the subconscious discloses the intimate sources of mental life. It must not be thought of as an independent or mysterious agency—a subconscious self that is a double of the self we know—but as an integral phase of the unified self that we recognize as the individual character. The abnormal cases, it is true, suggest independence and division; but the theory of dissociation establishes the gradual links from

normal to abnormal that make clear that one relation is responsible for the whole series. Many points remain obscure, and the temptation to fly to extreme hypotheses is strong. It is part of the success of modern psychology to have rescued the realm of the subconscious from confused and superstitious views, and to have brought it in line with the central facts of human nature.

J.J.

Relating to Various Beliefs. The articles on the following topics, while all do not bear directly on the subject treated above, are of interest in this connection:

Occult Astrology Palmistry Clairvoyance Phrenology Conjuring Physiognomy Psychical Research Demonology Divination Psychoanalysis Spiritualism Faith Cure Hypnotism Suggestion Superstition Magic Medium Telepathy Mesmerism Theosophy Mind Reading Trance Necromancy Witchcraft

SUBJECT, in government. See CITIZEN (A Citizen of Canada).

SUBJECT (in grammar). See SENTENCE (Parts of a Sentence).

SUBJECTIVE MIND. See TELEPATHY.

SUBLIMATION, sub lih ma' shun, the process by which a substance passes directly from the solid state to the condition of vapor, without undergoing the intermediate liquid state. The substance is then said to sublime. A familiar illustration is the drying of frozen clothes, hanging on the clothesline on a very cold day. Under a certain pressure, ice changes to vapor, or sublimes, by heat without melting. Iodine, arsenic, and camphor are substances which sublime at atmospheric pressure. industry, sublimation is used for purifying substances. In changing the substance to vapor, the impurities are left behind and the pure substance is obtained. The flowers of sulphur, that is, the common sulphur of commerce, afford one of the best examples of a substance obtained by sublimation. The flowers of benzoin and sal ammoniac are made by this process. See Vapor; Evaporation.

Psychologically, the deflection of the sex instinct to nonsexual and useful ends; more broadly, the deflection of the energy of any instinct. Thus, devotion to work or a reform movement sublimates the love instinct, and sports or games the aggressive instinct.

SUBLIME PORTE. See Turkey.

SUBMARINE, sub ma reen, a vessel capable of navigating either on the surface or under the water, used almost exclusively for military purposes. The first submarine dates to about 1620. Cornelius van Drebbel, Dutch scientist and protegé of James I of England, is said to have demonstrated his crude leather-covered rowboat-submarine then, navigating ten to fifteen

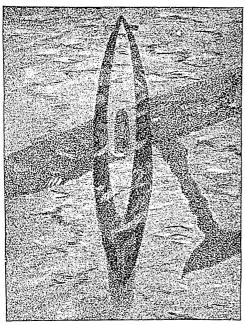
feet below the surface of the Thames.

The military possibilities fired the imagination of seventeenth century inventors, but no authentic record of an actual submarine attack is found until 1776 when David Bushnell's American Turile made its unsuccessful attempt to destroy the British Eagle in New York harbor.

The first successful submarine attack was made by the Confederate *Huntley* when its torpedo on the end of a spar sank itself and the Federal corvette *Housatonic* in Charleston harbor on the night of February 16, 1864.

It was not until October 13, 1900, that the Holland, named for its designer and builder, John P. Holland, was commissioned as the first submarine in the United States Navy. This craft was 53 feet long, displaced 75 tons, and was propelled by a gasoline engine on the surface, by an electric motor submerged. It had a torpedo tube in the bow but no periscope. The Holland's cruising radius was 1,500 miles at seven knots on the surface.

The rapid development of the submarine was given added impetus by the advent of the Diesel engine in 1906. By 1914, submarines were capable of 15.5 knots on the surface and 9.5 knots submerged, and could cruise 5,000 miles.



UNDER TWENTY FEET OF WATER
Photograph of a submerged submarine, taken from
an airplane whose shadow appears on the surface of
the sea.

In the early days of World War I (which see), many looked with disdain upon the submarine as a baby of the fleet tied to the apron strings of its mother ship. But on September 5, 1914, the German *U-21* sank the British

Pathfinder, first warship to be sunk by an automobile torpedo fired from a submarine. On September 22, three more British cruisers, Aboukir, Cressy, and Hogue, were destroyed by the U-9. Disdain of the baby of navies gave way to awe of this terror of the seas. The British Grand Fleet was forced to abandon its strategic base at Scapa Flow in search of greater security.

A THE STATE OF THE PROPERTY OF

The first submarine atrocity of the war was committed by the German *U-24*, when the French steamer *Amiral Ganteaume* with 2,500 Belgian refugees was torpedoed off Gris Nez on October 26, 1914. Although unrestricted submarine warfare by the Germans was not begun until February, 1917, many steamers were sunk without warning as early as February, 1915.

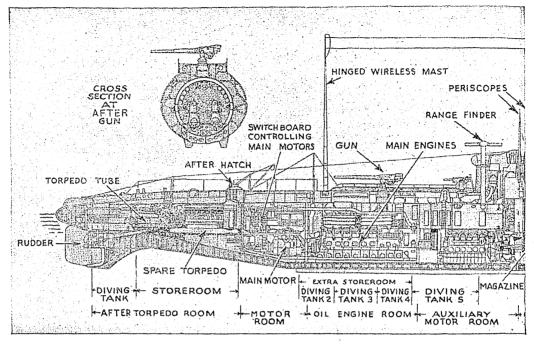
The submarine was developed as a warship to be used against warships but its unrestricted use by the Central Powers made it the wolf of the seas.

During the first three months of unrestricted submarine warfare, an average of 163 ships per month were sunk by submarines, or about one ship every four and one-half hours. The total war losses directly attributable to the submarine were over 5,700 ships of approximately 11,000,000 tons and 12,000 lives. The Germans lost 178 of their 371 submarines and over 5,000 of 13,000 submarine personnel.

The United States was drawn into the conflict by, and was the cause of the failure of unrestricted submarine warfare. The British knew the efficacy of convoy but could not spare the men-of-war to put it into general use. With the United States entry on the side of the Allies, British cruisers were released from blockade duty. With these cruisers plus the United States men-of-war, the system of providing large convoys of merchant ships and transports with armed escorts in the danger zones was instituted. Of over 77,000,000 tons of shipping in organized Atlantic convoys from July 26, 1917, to August 5, 1918, only 654,288 tons were lost, whereas in the one month of April, 1917, Great Britain alone lost 516,000 tons.

So great was the submarine menace that the inventive genius of the Allies was enlisted in the development of the many means of combating the submarine. One of the first methods was the adoption of the system of zigzagging whereby all ships in company changed course a set number of degrees at predetermined times according to various plans. Escort by fast shallow-draft armed vessels was another early development. The shallow draft reduced the danger of being torpedoed, as the torpedo does not hold its course well when set to run too shallow. Nets of various types used in various ways were thoroughly tried. Mine fields were extensively used by both sides, many being planted by the submarines themselves. Mystery ships disguised as trawlers sought to





LONGITUDINAL SECTION OF

lure submarines to attack on the surface where their concealed guns could be used. Submarines were towed astern of trawlers and given directions by telephone when an enemy sub-marine came in to attack. Depth bombs were designed to explode at set depths. Explosive sweeps were made. Many systems of listening gear were developed to detect the presence of the submarine and follow it. Airplanes were used to locate and bomb the submarines. marines were used to stalk and torpedo their enemy brothers. Small armed patrols hunted the underwater marauders. Ships were camouflaged with mottled designs to reduce their visibility and baffle the submarine commander in estimating the course of the target. Merchantmen were armed. Booms were thrown across the entrances to important harbors and thousands of other ideas never tried, for practical reasons, were submitted.

Some idea of the effectiveness of these various means is given by the following analysis of the German submarine losses: sunk by mine, 44; depth charge, 38; submarine, 19; gunfire, 16; ramming, 15; decoys, 12; aircraft, 6; nets, 6; high explosive sweeps, 5; accidents, 4; capture, 1; wrecked, 1; unknown, 11; total lost, 178.

A modern submarine is a double-hulled craft of approximately circular cross section, the outer hull deviating therefrom as necessary to give good sea-keeping characteristics. The inner, or pressure hull, is strongly built to withstand the great pressure to which subjected when deeply submerged. At 200 feet this pres-

sure is 88.4 pounds per square inch of hull surface. The force at this depth acting on an escape hatch 25 inches in diameter is approximately 44,000 pounds. The outer hull, being subjected to sea pressure from within as well as from without, does not require great strength.

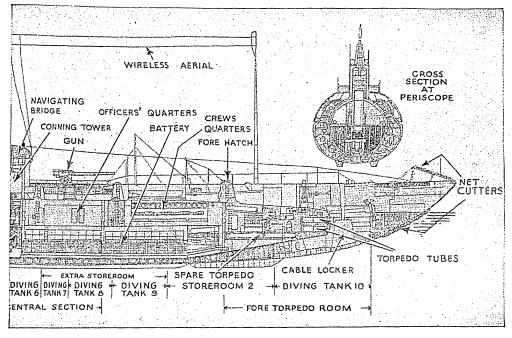
Between the two hulls are annular spaces. some of which are used as fuel oil tanks and others as mere air spaces when the submarine is on the surface. These air spaces, or so-called ballast tanks, are capable of being flooded or freed of water by large valves controlled from within the ship.

When the ballast tanks are flooded, the reserve buoyancy of the submarine is lessened and the boat has positive, negative, or neutral buoyancy, depending upon the amount of water ballast contained in the trimming tanks within the inner hull. This amount is accurately varied by the diving officer according to the number of men on board, weight of stores, height of electrolyte in battery cells, amount of fuel oil or other variable weights, so that when the ballast tanks are flooded the ship will have approximately neutral buoyancy. A mistake in these calculations is a serious jeopardy to the safety of the ship for, if too heavy, depth control may be lost and the submarine reach a depth which will crush it.

The trimming tanks are distributed along the axis of the ship, forward, amidships, and aft, to admit of properly distributing the variable water ballast to prevent the ship from being

bow or stern heavy.

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A MODERN SUBMARINE

At each end of the submarine are large fin-like horizontal rudders, called planes, capable of being rotated about their horizontal axes from the control station within. When tilted from the horizontal position the planes have vertical components of force impressed upon them if the submarine is moving ahead or astern. The diving officer utilizes these forces to change or maintain the depth at which the submarine runs.

The submarine is propelled on the surface by two screws driven by Diesel engines. This type of engine runs on oil similar to fuel oil used for heating purposes. Being internal combustion engines, Diesels require a large amount of air which is not available when the boat is sealed for a dive. For this reason the submarine has electric motors for turning its propellers when submerged. The energy for these motors is supplied by large storage batteries, usually of the lead-acid type. The batteries can be recharged by the Diesel-driven generators only when the submarine is on the surface.

The average modern submarine is capable of about 20 knots on the surface and about 9 knots submerged. Cruising radii vary widely but are reported as high as 16 000 miles.

reported as high as 16,000 miles.

Useful as an arm of the fleet, as a mine layer, as a commerce raider, or as a coast patrol, the submarine has been denounced and championed at every disarmament conference since World War I. International law has encompassed it with the same restrictions which apply to the surface man-of-war in the matter of dealing with commercial ships, and nations

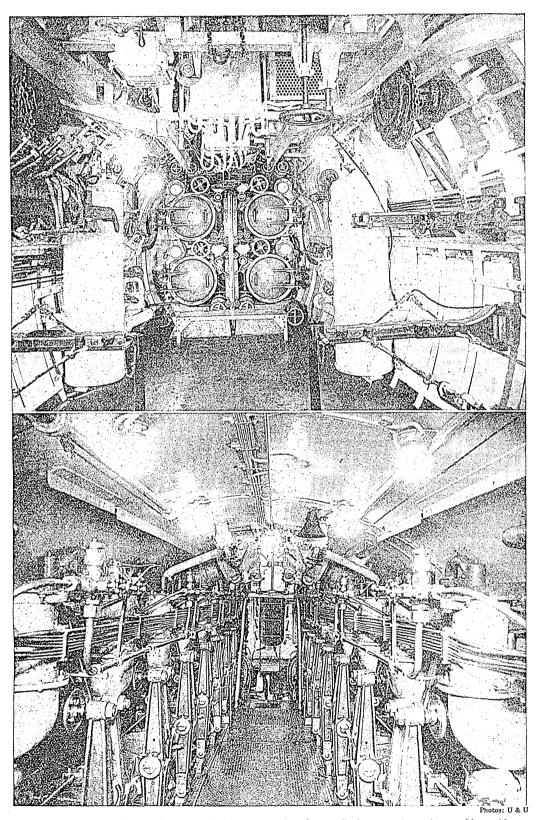
generally deny it the hospitality accorded to other men-of-war in neutral ports. Nevertheless the navies of the world are building more submarines now than any time since World War I. As of July, 1941, the estimated strength of the leading navies in undersea craft follows:

SUBMARINES

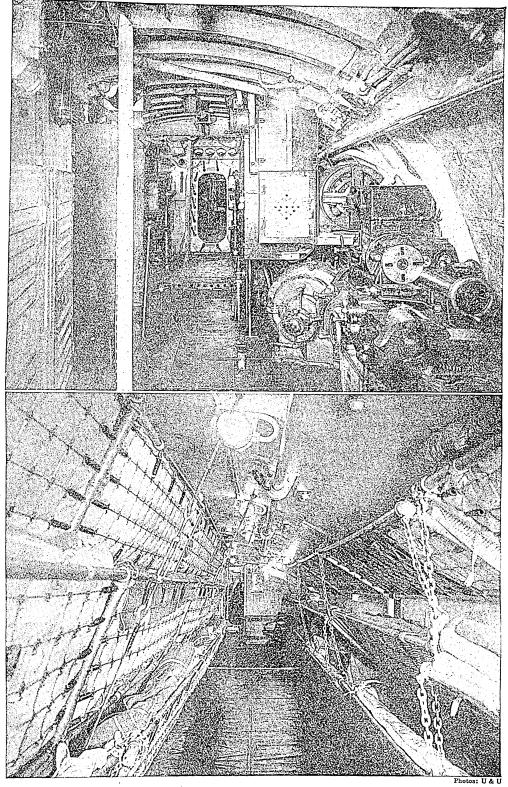
United States	110
British Empire	48
Japan	70
Italy	85
Germany	150

The submarine was tried as a commercial craft in 1916 when the *Deutschland* made its semi-commercial and semi-propaganda cruise from Germany to Baltimore, Md., with a cargo of chemicals and dyestuffs valued at \$1,000,000. Other similar cruises were made, but the submarine is considered commercially impractical.

In peace or war the submarine imposes great hardships on its officers and crew and demands of them cool-headed teamwork of the highest order. The space for living accommodations is very limited. When submerged for a long time the contained air in the boat becomes an obnoxious admixture of battery gas, fuel-oil fumes, and dives the air must be tested for hydrogen content to avoid an explosive mixture. On long dives it must be tested for carbon dioxide content to avoid detriment to health of personnel. Physical exercise while submerged must be limited to prevent too rapid use of oxygen; men

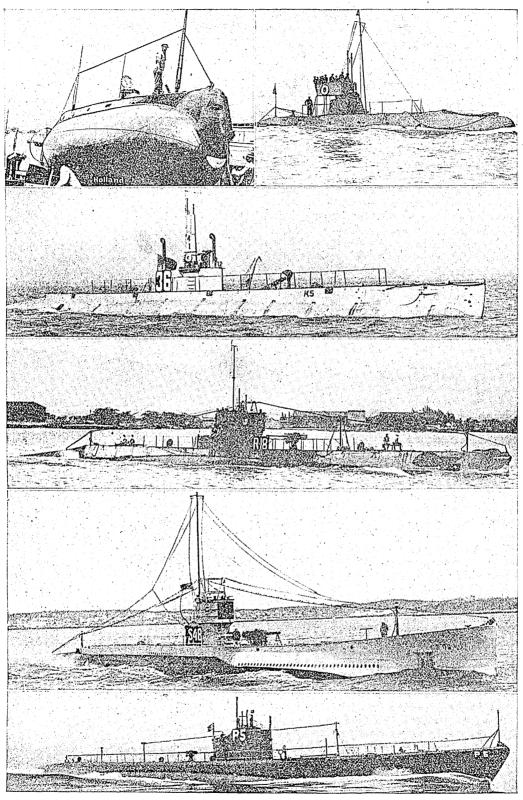


Crowded Interior of a Submarine. (I.) Machinery occupies almost all the space in undersea ships. Above, the torpedo room; torpedo tubes are in the center of the photograph. Below, a view in the engine room. 6890

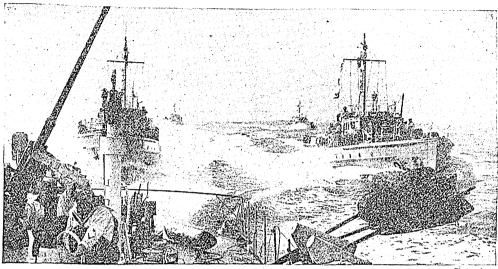


THE SHIP THE PROPERTY OF THE P

Crowded Interior of a Submarine. (II.) Above, a view in a motor room. Below, sleeping quarters for the crew. When the bunks are lowered, there is but little passageway. 6891



Development of the Submarine. In chronological order important types in the development of the submarine are: Holland; C-5; K-5; R-18; S-48; P-5.



MINE SWEEPERS CLEAR THE WAY

AND THE PROPERTY OF THE PROPER

These German auxiliary boats are sweeping the sea for mines, always a difficult and dangerous job. On the boat in the left foreground, a powerful antiaircraft gun is manned for action against possible enemy planes.

not on stations usually sleep or read. Those on stations must be constantly on the alert and maintain silence. Despite the many hardships

the esprit de corps is generally very high.
Submarine Warfare began almost immediately upon the outbreak of World War II, for by means of it the Germans hoped to break the British blockade. After the United States began to wage economic warfare, the Axis Powers intensified their U-boat campaigns in the Atlantic and the Mediterranean so as to prevent American merchant vessels from carrying lend-lease goods. The Allies developed better methods of detecting and combating submarines, and strongly protected convoys helped to cut losses of troops and equipment.

The Germans made special use of smaller submarines which, operating off the Norwegian coast, harassed the northern supply line to Russia. The Japanese also used midget submarines with a two-man crew in their surprise attack on Pearl Harbor. The British and Americans were aided by Dutch, Fighting French, and Russian submarines.

Among improvements in submarine operation is the firing of torpedoes without surfacing. Heavier hulls also permit deep diving to escape the concussion of depth bombs. The latest model of German submarine is operated, when submerged, by means of compressed oxygen, thus enabling the surface speed to be increased to 25 knots and the cruising range extended to 24,000 miles. See World War II.

SUBMARINE CABLE. See CABLE, SUB-

SUBMARINE MINE, an underwater weapon of destruction capable of sinking most types of ships and seriously damaging huge battleships.

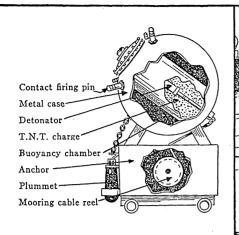
History. Although powder-loaded vessels with clockwork-detonating devices were employed as early as 1585, it was not until David Bushnell demonstrated to noted personages in Connecticut that gunpowder could be detonated beneath the surface of the water that the submarine mine was added to the list of weapons of war. In 1777, Bushnell unsuccessfully attempted to destroy the British frigate Cerebus in Long Island Sound, by dragging a container of gunpowder fitted with a gunlock against the ship's side. The mine fouled and sunk a schooner instead.

During the Crimean War (1854-1856) the Russians employed submarine mines of mechanical type designed by M. Jacobi. They contained about twenty-five pounds of gunpowder ignited by a chemical fuse consisting of a glass flask of sulphuric acid which was made to fall on chlorate of potash. They had little effect.

It was not until the Civil War in America that submarine mines were employed with sufficient success to arouse serious interest in their development.

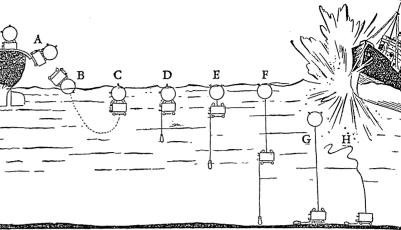
Modern Types. Mines are of two general types, fixed and floating. The fixed mines are usually held in place by a heavy anchor and cable, capable of adjustment for the depth below the surface at which it is desired to have the mine located. Fixed mines are variously designed to be fired by contact, electricity, timing device, fuse, or magnetic force. When fixed mines are designed to be fired by electric circuit closed on shore, observation stations are employed to determine when the target is sufficiently near the mines to be damaged.

MINE LAYING

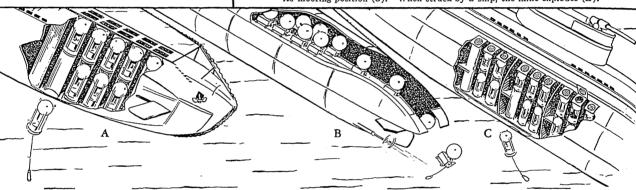


A CONTACT MINE

A contact mine is moored at a certain depth and held there by a cable attached to an anchor which rests on the sea bottom. It explodes when one of its firing pins is struck.



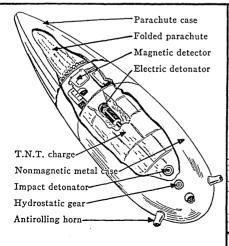
A contact mine, with anchor attached, leaves the laying track of a mine layer (A). The mine enters the water (B) and rights itself (C). The lead plummet, released when the mine left the track, stops running out when it reaches the depth at which the mine is to be moored (D). The anchor is released and leaves the mine (E). When the plummet reaches bottom, the mooring cable stops paying out (F). The anchor pulls the mine down to its mooring position (G). When struck by a ship, the mine explodes (H).



MINE LAYING BY SUBMARINE

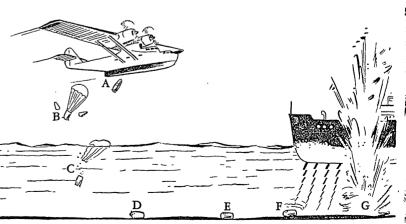
Mine-laying submarines are highly important war craft, for they are more likely to do their work and escape unseen than are other boats. As shown above, there are three general types. One drops mines from tubes located in the bow of the boat (4). In this type, the tubes open onto the deck above and can be reloaded at sea. Another submarine

slides mines from a track at the stern (B), much as surface sides mines from a track at the stern (B), much as surface craft do. The track is above the main body of the submarine and is operated from below. A third type drops mines from tubes carried along both sides of the vessel (C). The tubes open onto the deck and can be reloaded at sea. All three of these types are used only for mine laying.



A MAGNETIC MINE

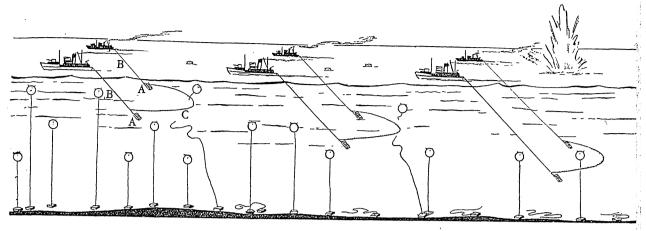
This type of mine, laid by airplane, is effective only in shallow water, for the magnetic field set up by a ship's metal hull penetrates only to a certain depth.



A magnetic mine is released from plane (A). A parachute, from which the mine is suspended, serves to break the shock which would otherwise result when the mine struck water (B). The parachute, now detached, remains on the water's surface, and the mine sinks (C). Two mines, in operating position, rest on the sea bottom (D and E). The magnetic field of a ship's metal hull attracts a mine's needle (F). The affected needle, having closed the electric circuit in the mine, fires a detonator, and the mine explodes (G).



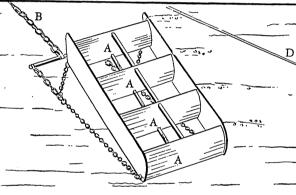
MINE SWEEPING



Working in pairs, shallow-draft mine sweepers clear mine fields planted by the enemy. Each vessel drags a multiplane kite (A) suspended from a towing cable (B). Connecting the two kites is a cutting cable (C) having a sawlike edge. When the mooring cable of a mine is caught by a

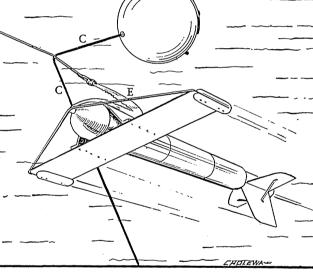
cutting cable, it is cut in two, and the released mine bobs to the surface. There the mine usually is exploded by rifle or machine-gun fire. As a rule several pairs of sweepers work together, their cables set at various lengths so as to miss none of the mines, moored at different levels.

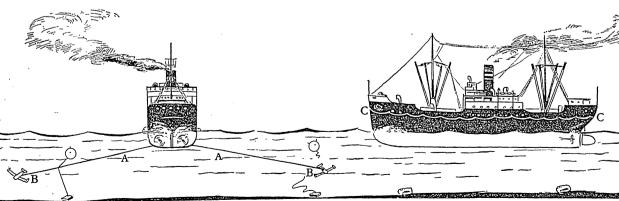
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KITE AND PARAVANE

Left: The multiplane kite resembles a stepladder and consists of several "steps," or planes (A), so slanted that water pushing against them forces the kite downward. It is attached to the ship by a towing cable (B). Right: The paravane looks like a small airplane and is so designed that water forces it away from the ship and downward. If the mooring cable of a mine (C) is struck by a paravane's towing cable (D), the mine is guided down the towing cable, into the paravane's cutter (E), and is there cut loose.





INDIVIDUAL SHIP PROTECTION

When mine laying became a part of modern warfare, inventors developed anti-mine devices that would reduce or eliminate the hazards. Left: A stern view of a ship, showing how paravanes are used as a protection against mines. Each of two towing cables (A), attached to the bow of the vessel below the water line, carries a paravane (B). As the

ship moves forward, the paravanes are pulled along behind and sheer away from its sides. Right: Another effective anti-mine device is the "de-gaussing girdle" (C), a cable charged to neutralize the magnetic field of the ship's metal hull. When equipped with such a girdle, a ship can pass over a large field of mines without exploding a single one.

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Floating mines are unanchored and therefore move with the water currents. They are often cast adrift in pairs with a line about 100 feet long between them. According to the laws of war, floating mines must be so designed as to become inoperative within a few hours after being set adrift.

Most modern mines are spherical or cylindrical in shape, contain large charges of high explosive, and are of rugged construction.

In November, 1939, a type of German mine which utilized the magnetic field of the victim ship to set in motion the detonating device, was used off the coast of England with deadly effect. The British claimed to have developed successful means of protecting ships against this

new type of mine.

During both world wars, ships towed two water kites or paravanes from the low point of the bow to lessen the danger of striking the anchored type of mine. The paravanes were so designed and rigged as to stream at an angle on each side of the ship. When a mine anchor cable hit a paravane tow cable, it slid along the tow cable to the knifed jaw of the paravane. This jaw cut the mine adrift from its anchor and the mine rose to the surface where it could be destroyed by gunfire. The paravane is quite effective protection against the anchored mine, but not against the magnetic or floating

Mine Laying. Mines are designed with safety features which safeguard against accidental detonation until a time interval has elapsed after laying. Surface vessels, submarines, and aircraft may be used for mine laying, but the submarine is most suitable for mining enemy harbors and channels. In mine laying, the depth of water and local currents must be known. The position of each mine is accurately determined and recorded so that charts of mined areas may be made with safe channels through them indicated for one's own

Mine Sweeping. Mine sweeping is a very hazardous task. Shallow draft vessels are employed in pairs to tow the sweeping wire as indicated in the illustration.

Areas may be freed of live mines by countermining. This requires systematic detonation of countermining mines to insure setting off of all mines in the area.

North Sea Mine Barrage. The great minelaying and mine-sweeping feat of all time was the laying and sweeping up of the North Sea Mine Barrage during World War I. This barrage extended for 230 miles from the Orkneys to the territorial waters of Norway. Its approximate width was twenty-five miles. A total of 70,263 mines were laid in lines at various depths from near the surface to 240 feet down, in order to prevent submarines from going under the barrage. The United States Navy planned

the barrage and made it possible by development of the antenna mine which extended the radius of effectiveness of each mine. British co-operated in the venture, laying 13,652 The United States Navy laid the other 56,611. At least ten and probably seventeen submarines were destroyed in this mine field which effectively closed the northern exit from the North Sea, thus contributing materially to the defeat of unrestricted submarine warfare. See SUBMARINE; WORLD WAR.

SUBPOENA, sub pe' na. If an officer of a court of law or other person serves one a written notice to appear and give testimony in a case in court, he must obey the command or be liable for contempt of court (see Con-TEMPT). The name applied to such a notice is subpoena, which is Latin for under penalty. If it is a subpoena duces tecum (bring with you under penalty), it contains a clause demanding that you bring to court certain papers, books,

or other exhibits. See WITNESS.

SUBSIDY, sub' sih dih. When the Union Pacific Railroad was built, it was known that for many years it could not hope to pay expenses, for its route was through as yet unsettled territory; however, the road was needed to induce western settlement, so the United States granted the railway corporation tracts of public land located along its line, as a partial reimbursement for the vast sum of money expended in building. Since then, other great pioneering railroads have received like important assistance. Aid of this nature, extended by a national, state, or city government to some private enterprise, for the purpose of helping it become established on a firm financial basis, is a subsidy, and the corporation or firm receiving the aid is said to be subsidized. Premiums or bounties on exports, and bounties paid for killing animals, are a form of subsidy (see BOUNTY).

The wrong use of this sort of aid has led many to believe that any subsidy is bad in principle; on the contrary, in such instances as that of the Union Pacific Railroad, it is a necessity, and is granted because the government believes that the benefit derived from the enterprise will be greater than its cost to the state. Merchant marines are often built up by the granting of ship subsidies. Before World War I, Germany gave \$800,000 a year to the Hamburg-American Line for the partial maintenance at sea of the great Vaterland, the Imperator, and other passenger vessels that could not be made self-sustaining. This general policy built up a great merchant fleet for the German Empire. In the American Congress, numerous efforts have been made to provide for subsidies to shipping companies, to revive the United States merchant marine, but subsidies as such have never been granted. However, financial assistance is now granted by means of mail contracts and long-term

loans with low interest rates. See Merchant

SUBTRACTION, the process of finding the difference between two numbers, or of taking one number out of another. The number subtracted is called the subtrahend. The number out of which the subtrahend is taken is called the minuend. The result is called the remainder, or difference.

Teaching of Subtraction. Addition and subtraction go hand in hand, but the latter is more difficult of mastery, because it is "association backward," while addition is "association forward." The mind readily turns the new problem of subtraction into the more familiar one of addition. One well-known author on the subject speaks of this translation of subtraction into addition as "having the advantage of using only one table for addition and subtraction, and of saving much time in operation." Another refers to it as "primitive, barbarous, awkward, and time-destroying."

1. Sarah has 9 pennies and Tom has 5 pennies. How many more has Sarah than Tom? Sarah has 4 more.



FIG. I

How many pennies must Tom get to have as many as Sarah? He must get 4.

In both the foregoing cases, we see that the difference between 5 and 9 is 4, and that 4 must be added to 5 to get 9. In addition, we say it in this way: 5+n=9. When we have the answer, we say 5+4=9. In subtraction, we say 9-5=n, and, having the answer, we say 9-5=4.

Addition	Subtraction
8 + n = 12	12-8=n
8+4=12	12 - 8 = 4
9+n=16	16-9=n
0+7=16	16-9=7

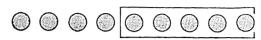
In addition, we say, "What number added to 8 gives 12?" In subtraction, we say, "8 taken out of or 'away from' 12 leaves what?" Those who would always look at the problem from the viewpoint of addition follow the wellknown "Austrian Method" of subtraction.
2. Sarah had 9 pennies, and gave 5 to Tom.

How many pennies has she left?

Here we clearly have the problem, 9-5=n; or, "When 5 is taken out of 9, how many are left?" This is not the problem of the difference between 9 and 5, like problem 1, and it is seen as in Fig. 2.

Concrete Work. As in addition (see ADDI-TION), much concrete work should be done in building up groups and taking them apart to

make subtraction clear; for example, a group of 12 pennies may be separated in various ways: 12=5+7, 12-5=7, 12-7=5. formal way of writing it must be introduced



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FIG. 2

slowly and carefully, with much oral work preceding it and accompanying it. Below are suggestions for concrete material:

- 1. Groups of pennies, nickels, dimes.
- 2. Groups of inch cubes, or cardboard squares. Compare various objects as to length, width, and height by measuring with foot rule or yard rule.
 - 4. Compare heights of children.
- How much farther can John jump than Dan? Measure in inches and subtract.
 6. Compare weights of articles.
- 7. Compare costs of various articles, using money.
- 8. Have foot rule, yard rule, scales, money, pennies, nickels, dimes, dollars (real money), cubic blocks, etc.

Home Help. At home, mother or father may do much to help at this point, for the freedom of movement and variety of material, and opportunity for measuring and grouping and thus getting material for comparison by subtraction, are much greater at home than in the ordinary schoolroom. (For further suggestion as to home help, see Addition.)

Subtraction Combinations. The following table presents the subtraction combinations of the numbers with differences of 9 or less. These should be used for drill, in accordance with the methods suggested in the section immediately following the table.

ı.	0	_ _ 0	0	3 0	4	5 0	6	7 <u>°</u>	8 <u>°</u>	9 0
2.	ı _i	2 	3	4 _1	5 	6 	7 	8 _ <u>r</u>	9 	10 1
3.	2 2	3 2	4	5	6	7	8	9 _2 	10	11 _2
4•	3 _3	4 <u>3</u>	5 <u>3</u>	6	7	8 _3	9 <u>3</u>	10 <u>3</u>	11 _3	12 _3
5•	4 _4	5 _4	6	7 _4	8 _4	9 _4	10 <u>4</u>	11 _4	12	13 <u>4</u>
6.	5 _5	6 _ <u>5</u>	7 _5	8 _5	9 _ <u>5</u>	10 _5	11 _5	12 _5	13 _5	14 _5
7•	6 6	7 6	8 6	9 6	6	6	6	13 6	14 6	15 6
8.	7	8 _ 7	9 _ 7	10 _7	11 _7	12 7	13 _7	14 7	15 7	16 <u>7</u>

Suggestions for Rapid Work. 1. Cards like the illustration may be held up before the class by the teacher for an instant, and the children may write each answer. When a number of cards have been shown in this way, the answers

may be given, and each child may know where he has made an error. In checking in this way, the teacher finds which combinations give greatest difficulty. The class may take sides in this, seeing which

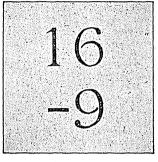


FIG. 3

side has the greater number correct. This may be done orally as a rival game, or just as a quick review.

A set of cards like the above may be passed to the class and exchanged among the children; the answers may be given orally, or written on the blackboard or on paper, but not on the card. Thus the same cards may serve many classes.

Placing lists of this kind upon the blackboard gives opportunity for comprehensive review, and for repeated review of any difficult subtraction. The lists may be long or short, and the subtrahend may be changed many times.

The problems are on the blackboard; the child goes quickly to the board, erases n, and puts the minuend number in its place.

5. 12 16 13 23 12 12
$$\frac{-n}{7}$$
 $\frac{-n}{7}$ $\frac{-n}{4}$ $\frac{-n}{14}$ $\frac{-n}{9}$ $\frac{5}{5}$

The child goes to the board, erases n, and puts the subtrahend number in its place.

6. Under Addition many suggestions will be found that may be changed to serve the purpose of the teacher in subtraction (see Addition).

Subtraction of Numbers of Two or More Digits. (a) Use dimes and pennies, and the first step is very simple. The child has 2 dimes and 7 pennies. He spends 9 pennies. What has he left?

Have a stack of pennies, so that he may change his dime for pennies.

(b)
$$\begin{array}{c} 27 \\ -9 \\ \hline \end{array} = \begin{array}{c} 10+17 \\ -9 \\ \hline 10+8=18 \end{array}$$
(c) $\begin{array}{c} 14 \\ +8 \\ \hline 12 \\ \hline \end{array} = \begin{array}{c} 22 \\ -8 \\ \hline \end{array} = \begin{array}{c} 10+12 \\ -8 \\ \hline \end{array}$

$$\begin{array}{c} 14 \\ 10 \\ \hline \end{array}$$

$$\begin{array}{c} 22 \\ 48 \\ -5 \\ \hline \end{array} = \begin{array}{c} 53 \\ -5 \\ \hline \end{array} = \begin{array}{c} 40+13 \\ \hline \end{array}$$

$$\begin{array}{c} 48 \\ -5 \\ \hline \end{array}$$

$$\begin{array}{c} 48 \\ -5 \\ \hline \end{array} = \begin{array}{c} 53 \\ -5 \\ \hline \end{array}$$

$$\begin{array}{c} 48 \\ -5 \\ \hline \end{array}$$

In the foregoing additions, we understand how 12 is made by 4 and 8, and how 13 is made by 5 and 8, and see that, when we come to subtract, we must think of 22 as 10+12, and 53 as 40+13 (see ADDITION).

$$65 = 50 + 15$$

$$-49 = 40 + 9$$

$$16 = 10 + 6$$

$$91 = 80 + 11$$

$$-48 = 40 + 8$$

$$43 = 40 + 3$$

Explanation: The subtraction is done beginning at the right: 9 from 15, 6; 40 from 50, 10. Then the sum of 10 and 6 is written to the left.

(d)
$$193 = 100 + 80 + 13$$

$$-147 = 100 + 40 + 7$$

$$46 = 40 + 6$$

$$243 = 200 + 30 + 13 = 100 + 130 + 13$$

$$-198 = 100 + 90 + 8 = 100 + 90 + 8$$

(e) In time the writing out in full may be dropped and the separation done mentally, as follows:

$$-\frac{243}{198}$$

Explanation: Take 10 from 40 or 1 ten from 4 tens and add it to 3, which gives 13. 8 from 13 leaves 5. Take 100 from 200 and add it to 30, making 130, or take 100, which is 10 tens, and add it to 3 tens, making 13 tens. 9 tens from 13 tens leaves 4 tens, or 40. The result is 45. This can be seen very clearly with dollars, dimes, and pennies.

Steps in Learning Subtraction. The following summary of the successive processes in learning subtraction may be found helpful:

1. Finding the missing number:

$$5+n=10;$$
 $4+n=8;$ 3 6 4 $\frac{n}{0}$ $\frac{n}{8}$ $\frac{n}{0}$

2. The same fact in a different form; find the difference:

3. Making change for amounts less than 10.

4. Writing subtraction with the minus sign:

$$8-5=3$$
; $6-3=3$; $7-5=2$

5. The subtraction combinations. (See earlier section.)

6. Subtracting two-figure numbers:

· 7. Subtracting with borrowing or carrying:

8. Subtracting three-figure numbers:

o. Zeros in subtraction:

Other Methods. There are other methods of subtraction in common use, but the above is explained most easily to the young mind. The Austrian Method sees subtraction as addition:

$$\frac{657}{-398}$$

Explanation: 8 and 9, 17; 10 and 5, 15; 4 and 2, 6. The minuend is held in mind as the sum of two numbers, and the subtrahend as one of these numbers. As the other number is found in each column, it is placed in the answer.

Another method:

Explanation: 8 from 17, 9; 10 from 15, 5; 4 from 6, 2. 10 is added to the minuend to

make 7, 17. To equalize matters, 1 ten is added to 9 tens in the subtrahend. 10 tens are added to 5 tens in the minuend, and again to equalize matters, 100 (which is equal to 10 tens) is added to the subtrahend. It is seen clearly in the following form:

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$$657 = 600 + 50 + 7$$

 $-398 = 300 + 90 + 8$

It becomes for easy subtraction:

$$600+150+17$$

$$400+100+8$$

$$200+50+9=259$$

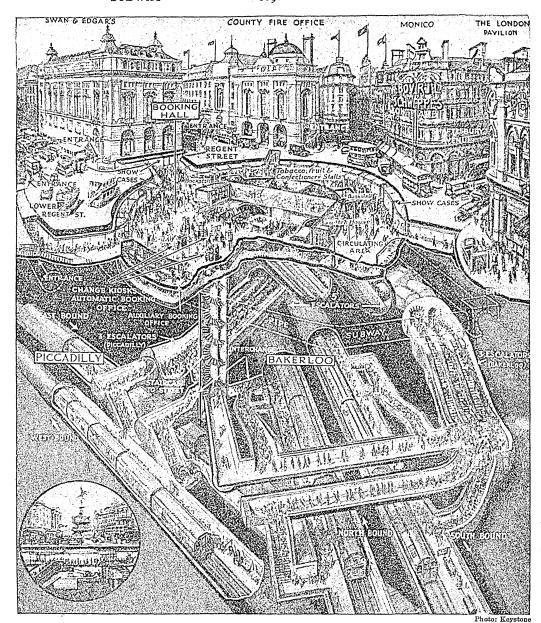
rro has been added to both minuend and subtrahend. This method is in common use among adult people, and is less strain upon the mind than the first method presented. But it should not take the place of that method with young children, because of the difficulty to the child mind of understanding it. It is easily adopted later. It is highly desirable that beginning students adopt a single method, and use it until the process becomes automatic.

Place Value. Read in connection with subtraction the articles Addition and Notation, where *place value* is discussed. E.U.G.

SUBWAY, OR UNDERGROUND RAIL-WAY, a tunnel or system of tunnels constructed for the purpose of placing a railroad beneath the level of the street. Such systems are coming more and more into use, and in some cities, especially New York, London, and Paris, they form a vast network of underground railways. London was the first city to adopt subways, and now has five systems affording quick and economic transportation to all parts of the city and suburbs. Some of London's subways, there known as "tubes," are so far underground that elevators are provided by which passengers may descend to them. A subway destined to grow to large proportions was opened in Buenos Aires in 1913; in 1924 Barcelona opened its subway; the Sydney subway was completed in 1926 and the palatial Moscow one, in 1938.

In the United States, subways have been constructed only in New York, Boston, Philadelphia, and Chicago. The New York subways form the largest underground-railway system in the world, and perhaps present the best example of passenger-subway construction. Chicago's subways were originally for freight alone, and nearly seventy miles long, under the central business district. In 1938, an 8.75 mile passenger-subway was begun, and 83.1 per cent tunneled in two years. The city still relies on street railways, suburban steam and electric roads, elevated railways, and hundreds of motorbuses for passenger service.

The first metropolitan subway built in London was operated by steam locomotives, and was opened in 1863. The first deep-level "tube" was opened in 1890, with electric locomotives.

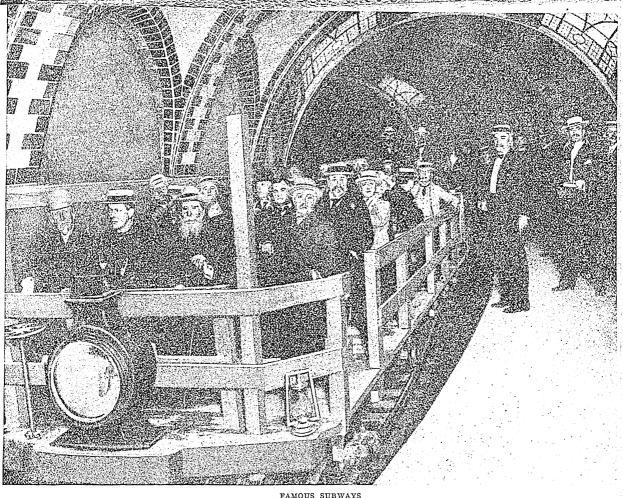


A SECTION OF LONDON'S UNDERGROUND RAILWAY

Declared to be the finest and most intricate system in the world. The illustration shows the center of the system, beneath Piccadilly Circus.

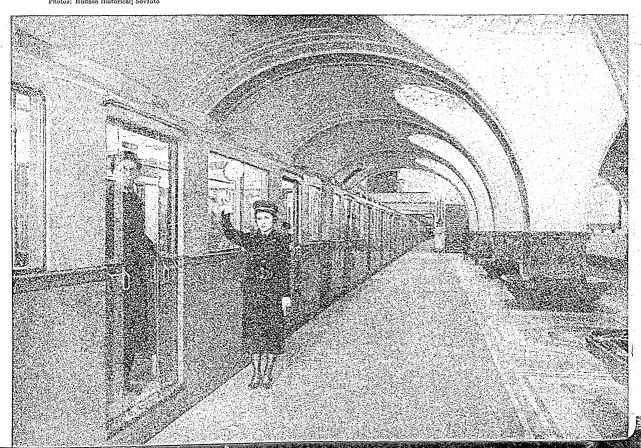
All subsequent subways have been operated by electricity. The cost of construction is very high; the New York system required an outlay of an average of \$2,000,000 to \$3,000,000 per mile, because the excavations provided for four tracks. So extensive is the subway system of New York and its suburbs that one may travel from the New Jersey shore, under the great city, and beneath two rivers into Long Island, without once seeing daylight. See New York City (Subways and Tunnels).

Subway Construction. In building a subway, one of two plans may be followed. When the opening is to be large, as in New York, the "open cut" is employed. The subways there are under the streets, and occupy all the subterranean space from curb to curb. First, the street paving is removed, and then workmen remove all soil and rock until the street level is twenty-five or more feet below the sidewalk line. At this depth, tracks are laid, stations are built, sidewalks are constructed, and



FAMOUS SUBWAYS

Above: When the first subway was opened in New York City in 1904, this open car took a group of city officials on a tour of inspection. Below: In Moscow, U.S.S.R., the subway, opened in 1935, transports more than one million passengers every day. Photos: Hudson Historical; Sovfoto



then the great opening is again covered at the street level, and street paving follows. If one line crosses another, one road bed must be placed at a much greater depth, for one line

must pass under the other.

The second form of subway, designed for one or two tracks, may be constructed by boring into the solid earth at the desired depth, without disturbing the surface above; the top and sides of the bore are protected by walls of steel or timber, during these operations. Such bores are usually circular, or nearly so, while a cross section of greater tubes, like the subways in New York City, presents a rectangular form. A cross section of a London "tube" is a semicircle.

Related Subjects. The reader is referred in these volumes to the article TUNNEL, and the additional references

SUCAT, the British name of Saint Patrick. See Patrick, Saint.

SUCCESSION, suk sesh' un, WARS, those wars that were caused by rival claims to the inheritance of a throne. Four important conflicts in modern European history are known by this name: the War of the Spanish Succession, the War of the Polish Succession, the War of the Austrian Succession, and the War of the Bavarian Succession.

The War of the Spanish Succession. This struggle began in 1701 and lasted until 1714. Its American phase was known as Queen Anne's

Charles II, king of Spain, was childless, and the question as to who would be his successor was of vital importance to Europe. Family alliances among related sovereigns were very common in those days, and if a foreign-born prince ascended the throne of Spain as nearest heir, which seemed inevitable, an entirely new alignment of the European powers was apt to be the result. The laws governing the succession were so involved, and the claims of the different heirs were so conflicting, that it is almost impossible to know who rightfully should have worn the Spanish crown. The valid claims soon were narrowed down to three heirs: the French prince Philip, Duke of Anjou and grandson of Louis XIV; Joseph Ferdinand, the young electoral prince of Bavaria; and the Archduke Charles of Austria, son of Emperor Leopold I.

The leading powers of Europe joined in a treaty in 1698, according to which Joseph Ferdinand was to become king of Spain, and France and Austria were to be compensated with territories from the extensive Spanish possessions in Italy and other parts of Europe. Unfortunately, the electoral prince died, and the matter was unsettled again. A second treaty, in 1699, arranged that the Archduke Charles was to receive the Spanish crown, and the French royal family would be indemnified by additional Spanish territory. Everything seemed to be arranged in order to guarantee the peace of Europe, when King Charles II died in Spain on November 1, 1700, leaving a will by which he bequeathed the crown to the French prince, Philip of Anjou. Louis XIV then broke his solemn word, given when he signed the treaty, proclaimed his grandson to be king of Spain and declared that the Pyrenees were no more. All Europe stood aghast at the prospect of the virtual annexation of the Spanish empire to the preponderant power of France, and Louis further angered the English by recognizing the son of the dethroned James II as the rightful king of Eng-

Almost immediately, the Grand Alliance was formed between England, the Holy Roman Empire, the Netherlands, Prussia, and Hesse, in order to prevent Philip of Anjou from becoming king of Spain, and to aid the Archduke Charles to ascend that throne in his place. The allied forces were placed under the command of two great generals, the English Duke of Marlborough and Prince Eugene of Savoy, under whose leadership the French were defeated decisively, during the years 1704 to 1709, in the battles of Blenheim, Ramillies, Oudenarde, and Malplaquet. The fighting was for the most part in Germany and the Netherlands, although there were several campaigns in Spain. These ended with the establishment of Philip as king, and the extension of

his rule over most of Spain.

The allies possibly might have overthrown Louis XIV and seized Paris had not dissensions broken out among them; in addition, party politics in England caused the Tory government of that country to desire peace in order to discredit the victorious Marlborough, who was a prominent Whig. Louis XIV, although badly defeated and with his country exhausted, took heart, and by skilful diplomacy brought about the Peace of Utrecht in 1713, by which he obtained fairly favorable terms, including the recognition of his grandson as king of Spain. France and Spain never were united, however. The emperor refused to sign the Treaty of Utrecht and did not make peace until a year later, when he found it necessary to give way and sign the Treaty of Rastatt, upon almost the identical terms of the Peace of Utrecht.

The War of the Polish Succession, fought during the years 1733 to 1735, was caused by the election by Polish nobles of Stanislaus Leszczynska, father-in-law of Louis XV of France, as king of Poland. Russia and Saxony forced the Poles to accept the Elector Augustus of Saxony as king, and war followed. France failed to keep Stanislaus on the Polish throne, but he was given the duchy of Lorraine, which

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reverted to the French crown at his death in 1766. Although France ultimately gained this territorial accession, its prestige received a damaging blow.

The War of the Austrian Succession was known in America as King George's War. The struggle began in 1740 and lasted until 1748. It was caused by the death, in the former year, of Emperor Charles VI, who left as heiress to his dominions a daughter, the famous Maria Theresa. The great powers of Europe had guaranteed her succession to the Austrian dominions, by the Pragmatic Sanction, but they broke their pledged word and attempted to despoil the young princess of her inheritance.

The first to attack Maria Theresa was Frederick the Great, king of Prussia, who conquered the province of Silesia. During the next year, 1741, he strengthened his hold upon the territory by an overwhelming victory at Mollwitz. France and Spain and the two strong German states of Bavaria and Saxony joined Prussia, and for a time Maria Theresa was threatened with the loss of her dominions. The Elector Charles of Bavaria was chosen emperor by support of the allies, and the Hapsburg family, for the first time in 300 years, failed to hold the throne of the Holy Roman Empire.

However, Maria Theresa saved her crown and most of her dominions by her own indomitable courage and vigorous leadership. She appealed to the Hungarians to defend her, their queen, and also roused the other people of her varied dominions to her support. Furthermore, she was aided by an alliance with the great maritime powers, England and Holland, which crushed the power of France at sea. Maria Theresa soon drove out the new emperor, Charles VII, even from his Bavarian dominions, and he died in 1745. She then received the title of empress through the election of her husband, Francis of Lorraine, as Emperor Francis I.

Maria Theresa, after making two separate treaties of peace with Frederick the Great, finally separated this most dangerous antagonist from the alliance with her other enemies, but accomplished it only at the price of the cession to him of Silesia. Also, with the aid of the armies of her English and Dutch allies, she carried on the war against France and Spain with great vigor and success. However, her successful career was checked by the brilliant victories of the French army in the Austrian Netherlands, under the command of the German-born Marshal Saxe (which see), and as her dominions, excepting Silesia, were safe under her control, she was induced by the more peaceful attitude of her allies, England and

Holland, to agree to make peace.

The Treaty of Aix-la-Chapelle, which was signed in 1748, finally ended the war. Maria Theresa, however, refused to consider that she

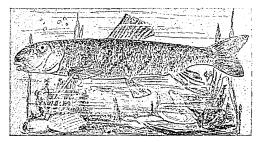
had lost Silesia beyond recovery. The empress at once began the negotiations that led to the realignment of the European powers, and to her final attempt to destroy Frederick the Great and regain Silesia, through a later conflict that was to be known as the Seven Years' War.

The War of the Bavarian Succession was a short quarrel, during the years 1778 and 1779, over the succession to the throne of Bavaria and the disposition of part of the Bavarian territory. The dispute was between Prussia and Austria. The Elector Maximilian Joseph died in 1777, leaving no direct heirs. Austria then attempted to dominate the affairs of Bavaria and to dictate the succession, thus arousing the jealousy of the ever-watchful king of Prussia, Frederick the Great. Both Prussia and Austria invaded Bavaria with their armies, and a bloody war seemed inevitable, but no battle was fought, and the dispute finally was compromised. Neither country was anxious for war, and France and Russia used their good offices to mediate and secure peace. Treaty of Teschen was signed in 1779, and both Austria and Prussia were satisfied by certain territorial gains. This war was not of very great historical importance, except for the fact that, by accepting the mediation of Russia, the powers recognized that country as a member of the family of European nations, and its influence increased from that time.

Related Subjects. For other details as to the Succession Wars, the reader is referred in these volumes to the following articles:

Aix-la-Chapelle, Treaties of Blenheim Charles (VI, Holy Roman Empire) Frederick (II, Prussia) French and Indian Wars (Queen Anne's War and King George's War) Louis (XIV, France)
Maria Theresa
Marlborough,
Duke of
Seven Years' War
Spain (Government
and History)
Utrecht, Peace of

SUCCORY, suk' o rih. See CHICORY. SUCKER, the name given to several kinds of fish closely related to the catfish family, which have mouths with thick, fleshy lips.



THE SUCKER

There are several species, all of moderate size, and all, except one Siberian group, natives of North America. They are dull-colored except in spring, when the males have rose or orange markings. Suckers are found in rivers, lakes,

bayous, and mill ponds, where they obtain their food by sucking up mud and soft organisms from the bottom. They are of little value, because their flesh is soft and tasteless. Suckers are placed by zoölogists in the genus *Catostomus*.



A NATIVE OF THE SUDAN, IN FULL DRESS

SUCKER STATE, a popular name applied to Illinois (which see).

SUCKLING, SIR JOHN (1609-1642), an English lyrical poet of the metaphysical group, born at Whitton, Middlesex, and educated at Cambridge. He fought under Gustavus Adolphus, amused and startled London with his wit, bravado, and spendthrift habits, and spent immense sums of money for Charles I in the conflict with Cromwell. Accused of taking part in the plot to release Strafford (which see) from the Tower, he fled to the Continent. Facts about his later life are obscure, but it is believed that he finally returned to Paris, and there poisoned himself.

His Best-Known Poems. His Why So Pale and Wan, Fond Lover; A Ballad Upon a Wedding; and I Prithee Send Me Back My Heart are famous.

SUCRE, soo' kray. See BOLIVIA (The Cities). SUCRE, a standard coin in Ecuador. See Money (Values of Foreign Monetary Units).

SUCROSE, su' krohs. See BIOCHEMISTRY (Substances in Animals and Plants).

SUDAN, soo dalm', formerly spelled SOUDAN, a general term applied to a region of Central Africa, extending roughly from the Sahara Desert on the north to Belgian Congo on the south, and from the former French Senegambia and Niger, on the west, to Egypt. The region is inhabited by negro and Arab tribes, but is controlled by Great Britain and France; the extreme western section is under French influence, and the eastern section, or Anglo-Egyptian Sudan, is governed by the British. During World War II, there were border skirmishes between British and Italians. See Anglo-Egyptian Sudan Sudan and French Sudan.

SUDAN GRASS, a hay plant introduced into the United States in 1909 from Khartum, Sudan, by the Federal Department of Agriculture. First tested in Texas, it gave such excellent results that thousands of acres were planted in the South and Southwest, both in humid and in irrigated sections. Eventually, it spread to nearly all parts of the country. Sudan grass has a fibrous root system, and is grown from seed which must be planted every year, as it is an annual. As it has no perpetual rootstock, there is no danger of its becoming a weed and a pest. The grass is cultivated both as a forage plant and for its seed. Sudan hay has a higher feeding value than timothy, and is liked by stock, especially hogs. It is one of the best drought-resisting plants known to American farmers, and can be grown on almost any kind of soil, but does not do well in high altitudes. Two cuttings of hav a year can be obtained in semi-arid regions, and three in humid sections. The first crop matures in from sixty to eighty days.

Classification. Sudan grass is closely related to sorghum (which see). It is classed as Andropogon sorghum sudanensis, in the grass family, Granineae.

SUDERMANN, zoo' dur mahn, HERMANN

(1857-1928), a dramatist and novelist, born at Matzicken, Prussia. He was educated in the public schools of Elbing and Tilsit, and in the University of Königsberg, Prussia, where he made a close study of history, literature, and philosophy. For a short time, he was a private teacher in Berlin, but in 1881 he became editor of a newspaper in that



HERMANN SUDERMANN

city, and three years later began to devote his entire time to writing plays and fiction.

The main ideas through all the work of Sudermann are the unnecessary strain, nervousness, and violence of modern civilization, the emptiness of many of the so-called moral rules handed down from previous generations, and the right of every human being to a happiness which shall not be hampered by artificial conventionality. He uses these theories over and over, often with gloom and bitterness, but never without absolute truthfulness. As an unsparing investigator of modern social life, he has few equals.

Sudermann's Works. His earlier novels, Dame Care and Regina, attracted very little attention, but in 1889 he sprang into national fame with his drama of German life, Ehre. Two gloomy but truthful tragedies, The End of Sodom and Magda, followed, dealing with the strained, artificial life of the modern city. The last-named play has been presented in nearly every great city in Europe and America, and Sarah Bernhardt and Eleanora Duse interpreted the principal rôle with great success. Among other dramas that have made an international impression should be mentioned Morituri, The Fires of Saint John, The Joy of Living, and Stone upon Stone. Sudermann's most powerful novel was Es War. The work of his later years lacked his original vigor, doubtless because the rapid changes and the new freedom of thought and living which followed the World War robbed him of his most effective themes.

In 1921 he published the drama *The German Fate*; this was followed by his autobiography and other writings, including *The Mad Professor*.

SUE, EUGÈNE [MARIE JOSEPH] (1804-1857), a French novelist, born in Paris, who will always be remembered for his outstanding book, The Wandering Jew. His father, who was a physician in Napoleon's army, left him a large fortune, and after some study of medicine in his native city, and practice of it in the French army, Sue settled in Paris, to devote his time to writing. He had been on the sea a great deal, both as a boy and as a physician, and used his knowledge of ocean animals and plants in such weird romances as The Salamander and Kernock, the Pirate. These books appeared during the days of the romantic movement in French literature.

They were followed by novels dealing with the mysterious and the supernatural, with occasionally a touch of socialism, which was then gaining favor. Among the most noted of these stories were *The Mysteries of Paris* and *The Wandering Jew*, which showed extraordinary imagination and ability to impress upon the reader the idea of the horrible and uncanny. The plots, however, are very loosely constructed. The style is often careless, which defect has been careful and translations. R.T.H.

SUEDE, swade. See LEATHER.

SUEZ, soo ez', EGYPT. See EGYPT (Modern

SUEZ CANAL, a ship canal extending in a north-and-south direction across the Isthmus

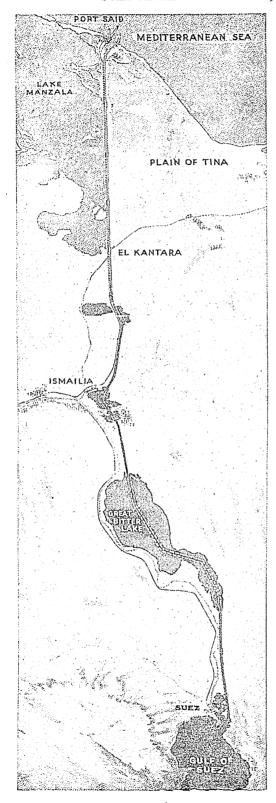
of Suez in Egypt, connecting the Mediterranean and Red seas. From Port Said, on the Mediterranean, it extends to Suez, on the Gulf of Suez, a distance of 103 miles, twenty-one miles of which consist of small lakes. Its construction, shortening the route between England and India by 6,000 miles, restored the Mediterranean to its ancient place as the most important highway of European and Asiatic trade.

The Suez Canal has no locks, because there is no important difference between the levels of the two connected seas. As it was originally built, it was twenty-six feet deep and seventytwo feet wide at the bottom. Because of the large increase in traffic since its construction, and the greater dimensions of modern vessels, the canal has twice been widened and deepened, and dredges are continually in operation to remove the sands, blown from the desert. In the beginning, the digging was done entirely by manual laborers, who scooped up the dirt with their spades and threw it over the banks; after 1865, machinery was used. The waterway was opened to night traffic in 1887. Ships were required to be equipped with electric searchlights, thus providing light through the canal at night. In 1886 the time required to go through the canal was about thirty-six hours; to-day, the trip can be made in less than half that time. The cost of construction of the canal, with improvements, was estimated at \$127,000,000, and though it is about twice the length of the Panama Canal, it cost only a third as much.

An important recent addition in the canal district was the establishment of the new city, Port Fuad, on the Asiatic side of the canal. It was built as a garden city, to provide homes for the many employees of the company, and to relieve the congestion at Port Said. Suitable homes are provided for all the many professions and classes represented in the per-

sonnel of so great a company.

History. There is evidence that a canal was built, connecting the Nile River and the Red Sea, many centuries before Christ, and the idea of joining the Red Sea and the Mediterranean may be traced to the eighth century A.D. Napoleon appreciated the advantages of a waterway across the Isthmus of Suez when he visited Egypt in 1789, and ordered surveys to be made. However, it was left to Ferdinand de Lesseps, a French diplomat and engineer, to carry out the scheme. Near the close of 1854, De Lesseps succeeded in obtaining permission from the viceroy of Egypt, and within the next five years worked to overcome various diplomatic, political, and economic obstacles which were set in his way. An International Consultative Commission met in 1855 to discuss the plans and decide the route, and by 1858 a company was organized with a capital



stock of about \$40,000,000, over half of which was subscribed in France, about one-fourth in the Ottoman Empire, and an almost negligible amount in other countries, the remainder being held by the viceroy of Egypt. The construction work was begun April 25, 1859, and ten years later, on November 9, 1869, the canal was opened for traffic, amid an elaborate ceremony attended by the emperor and empress of France, and presided over by the irresponsi-

ble Ismail I, khedive of Egypt.

England, whose large colonial possessions in Asia were brought thousands of miles closer by the Suez Canal, and which benefited most from its construction, had no part in its building, and bought none of the original shares. However, within six years after the grand opening, the prodigal khedive had sent his country into bankruptcy, and looked to his Suez Canal shares to supply him with ready money. Disraeli, Prime Minister of England, took advantage of this opportunity to gain a measure of control in the canal. The khedive's shares were purchased by the British Government, and today Great Britain holds sevensixteenths of them. The French Government owns no shares, though it enjoys financial benefits through taxation of the company. An international committee, on which there are ten British, one Dutch, and twenty French members, directs the management of the canal.

By an international convention, in 1888, it was agreed that the canal should always be open on equal terms to the ships of all nations, both in peace and in war. Great Britain refused to sign the convention, and demanded certain concessions, because of its interests in Egypt. However, in 1904 that nation agreed to the original terms, including the provision that no special privileges, such as policing, fortifying, or preferential tolls, were to be allowed any one nation. In 1914 Great Britain ignored certain stipulations of the treaty of 1888, and put armed forces on both sides of the canal, allowing only the ships of neutral and allied powers to pass. In 1915 the Turkish army made an attack on Egypt, which was soon repulsed. During World War II, the canal was of vital importance, for the power holding it and Gibraltar could dominate the Mediterranean. Axis campaigns in Africa aimed at breaking British control of the canal. See LES-SEPS, FERDINAND DE; CANAL; WORLD WAR II (Italy's War Effort); and page 2143.

SUFFRAGE, the right to vote, and thus, indirectly, to participate in the conduct of the affairs of a government. In states in which the government is representative, the people have the privilege of selecting certain persons to

ROUTE OF THE SUEZ CANAL

From the Mediterranean Sea, at the north, southward to the Gulf of Suez, an arm of the Red Sea.

MANAGEREPERENTALISMENT OF THE PROPERTY OF THE

take care of the political and governmental affairs. From an early period, the men of civilized countries have considered it their right to take some part in the government by giving their consent in the way of a vote, whether it be orally, by a clash of shields, by means of colored balls or other objects, or by secret ballot. Like most privileges, suffrage has always been restricted, to a greater or less degree, by property qualifications, social status, religion, sex, race, education or understanding, moral character, taxes, residence, and age. Gradually, the less vital restrictions were dropped, the more liberal and enlightened states leading the way, and to-day, in the leading countries, the main qualifications have to do with citizenship, age, good character, and residence.

In the United States. During the early years of the United States, even with the broad principles contained in the Declaration of Independence, less than one-fourth of the men of the country were permitted to vote. There were religious and property qualifications and class distinctions. In colonial times, as the political organization became more complex, more elaborate restrictions were made, to insure that only those who were capable, in-telligent, and interested in the welfare of the community should be allowed to vote. The prerequisites calculated to determine whether or not a man had these qualifications were often narrow and bigoted. Certificates of church membership were required at one time; Ouakers were considered unfit for the suffrage in most of the colonies; Roman Catholics, Jews, and free negroes alike suffered disfranchisement. Property qualifications were almost universal; in some colonies, possession of real estate was required; in others a certain amount of personal property was sufficient; and another variation was evidence of paid

After the adoption of the Federal Constitution, which left the determination of suffrage qualifications to the states, religious restrictions rapidly disappeared, and even property tests were made less stringent. As the influence of the frontier and the democracy of the West began to be felt in the more conservative Eastern states, property qualifications began to disappear, and practically all male citizens over twenty-one years of age, who were able to satisfy certain residence requirements, were permitted to vote. Small tax qualifications remained in a few of the states.

After the War of Secession and the granting of citizenship to more than four million negroes, a new and difficult suffrage problem presented itself. The radical elements in the North, which believed that the Southern leaders should be punished for their part in the strug-

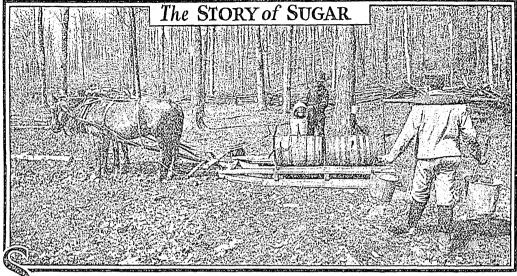
gle, and who feared the consequences should these leaders regain their political power, insisted that the whites who had participated in the war should be disfranchised, and the vote be extended to the negroes, though they were unschooled in the affairs of politics, and largely illiterate. Accordingly, Congress proposed to amend the Federal Constitution, which up to this time had left regulation of the franchise a power of the state. The Fourteenth Amendment decreed that any state denying suffrage to a male citizen twenty-one years of age, except for participation in rebellion or other crime, should suffer a reduction in its congressional representation, such reduction to be in proportion to the number disfranchised.

In order to compel the Southern states to ratify this amendment, the Reconstruction Acts of 1867 were passed, which allowed the negroes to vote, and required that a state convention ratify the amendment before it was readmitted into the Union. After the states conformed to these specifications and were readmitted into the Union, evasions of the Fourteenth Amendment became evident, and the Fifteenth Amendment was adopted. This is more definite, and states that a citizen shall not be denied the right to vote because of "race, color, or previous condition of servitude." The Southern whites were unwilling to allow the negroes to vote, because in many states they outnumbered the whites, and, moreover, they were under the influence of unscrupulous politicians (see the article Reconstruction).

In most of the states to-day, adult citizens twenty-one years of age, who are able to satisfy lenient residence requirements, are permitted to vote. Most states require a year's residence in the state; other restrictions include literacy tests, poll taxes, registration, etc. Idiots, insane people, convicted criminals, and traitors are generally excluded. In all states aliens must now become bona fide citizens before they are awarded the right to vote. Discrimination because of sex remained quite general until the latter part of the nineteenth century. In 1869 Wyoming Territory allowed women to vote, and the provision remained in its constitution when it became a state. Slowly other states, Western ones first, enfranchised women, and in 1920 the Nineteenth Amendment to the Federal Constitution was passed, which forbade the denial of the right to vote because of sex. This became effective on August 26, 1920.

Related Subjects. The following topics may be consulted in connection with this article on suffrage:

Australian Baliot Ballot Constitution (Amendments) Election Grandfather's Clause, The Short Ballot Woman Suffrage



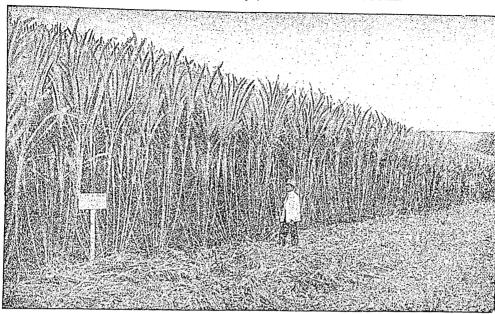
UGAR, one of the most important foods known. It helps to form fat in the body, and is a source of energy and heat. It adds to the attractiveness of many other foods when employed as a sweetening, and, if used in moderation, makes them more digestible. The most common form—the lump or granulated sugar that appears on the table at every meal—is produced by extraction from sugar cane or sugar beets. Such sugar has a fuel value of approximately 1,800 calories per pound, and is 100 per cent carbohydrate. Maple sugar is made from the sap of the sugar maple, and contains eighty-three per cent carbohydrates, sixteen per cent water, and one per cent ash. Grapes and the date palm, as well as the nipa palm of the Philippines, are also sources of sugar, but they bear no comparison with sugar cane and sugar beets in respect to commercial importance. In Germany a method of producing sugar from wood has been perfected (see below).

Cane Sugar. A description of the cane plant will be found in the article SUGAR CANE. The sugar itself is the result of a complicated milling process. One of the more common processes is here described. The cane, after being washed and cut into short lengths, or shredded, is fed into a machine equipped with ponderous rollers from eighteen to seventy-two inches in length, which squeeze the juice from Sometimes, two or three sets of the stock. rollers are used, the pressure being increased from set to set. By this process, from ninety to ninety-five per cent of the sugar in the cane is extracted. As the sugar passes from mill to mill, water at varying temperatures is sprayed upon it from a perforated pipe. The water assists in the grinding or macerating process, and increases the amount of sugar extracted. The crushed cane, called bagasse (ba gas'), is utilized as fuel to provide steam for carrying on the operations. The juice then undergoes purification, which is accomplished by applying chemicals, and by heating and filtering. Sulphur dioxide, which is used to bleach and disinfect the juice, further enables it to take up more lime—the most important chemical employed in manufacturing sugar. As soon as cane juice is squeezed from the cells of the stock, chemical inversion begins; that is, separation into fruit sugar and grape sugar. This injurious process is arrested by the addition of lime.

To produce the first sugars, the purified juice is reduced to a syrup in evaporators, and then boiled in open pans containing steam coils, or in vacuum pans, until the water is driven off and sugar crystals are formed. The resulting mass of crystals and syrup, called massecuite, is then carried to a mixing machine provided with revolving paddles, in which it is thoroughly stirred. From the mixer it is fed to revolving cylinders called *centrifugals*, in which the liquid portion is forced out through the meshes of a copper-gauze basket. This liquid, after being boiled and reboiled, becomes the molasses of The sugar crystals must be further commerce. refined and clarified, before ready for the market. Granulated sugar is formed in a revolving cylinder heated by steam, and loaf sugar is made by packing the fresh sugar in molds. The resulting blocks are then cut to the desired size and shape. Cheaper grades of sugar, known as coffee and brown sugar, are made from syrup yielded by first sugar.

Beet Sugar. Sugar was first extracted from the beet by a German scientist in 1747, but the industry was not developed until the nineteenth century. The beets, on reaching the factory, are first washed and conveyed to slicing machines, where they are cut by triangular

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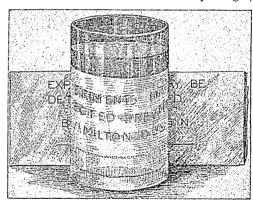
A SUGAR-CANE FIELD IN PORTO RICO

From the height of the man, it will be seen that the stalks of cane grow to twelve and fifteen teet.

knives into slices not unlike "shoe-string" potatoes. These slices drop through an upright chute into a diffusion battery, consisting of a series of tall cylinders holding from two to six tons each. These cylinders are known as cells. Warm water is run through the cylinders, passing from one to another throughout the battery, and drawing the sugar from the cells of the beets as it goes. This "diffusion juice," as it is called, contains from twelve to fifteen per cent of sugar. . The pulp left over from this process is fed to stock. The raw juice is next purified by being mixed with lime and treated with carbonic-acid gas. The purified juice is then carried to the evaporators, where heat is applied through steam coils. Having passed through the evaporators, usually four in number, the thickened juice is conveyed to vacuum pans and heated until crystals form. It is then treated in the mixer and the centrifugal machine like cane sugar. In America, most beetsugar manufacturers prepare their own raw sugar for the market, by putting it through a refining process. When it is highly refined, it cannot be distinguished from cane sugar.

Maple Sugar. The extraction of the sap of the sugar maple is a process that begins with the tapping of the trees in the late winter or early spring. A hole about an inch and a half deep is bored into the trunk, and into this hole is driven a metal or wooden trough, with a bucket on the end to receive the sap. Each day the sap is collected and taken to the sugar house, where it is boiled until the water content has been drawn off. This process may take place in an ordinary kettle or in a modern

steam-heated evaporator. The resulting syrup has so high a degree of purity that little clarification is necessary. Some of the syrup is poured into molds and left to harden into sugar. The black, silver, and red maples and the box-elder are all sources of maple sugar,



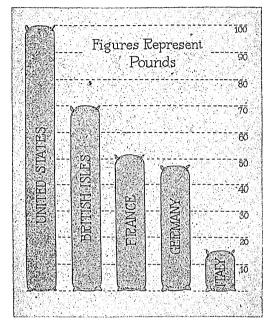
A TEST FOR PURITY

Pure sugar, when dissolved in water, should be so transparent that small type can easily be read through it.

but the greatest supply comes from the sugar maple. In the United States, Vermont and New York are the leading maple-sugar states; the latter produces about as much as the Canadian province of Quebec (see chart).

Sugar from Wood. A process for manufacturing sugar from wood reached a point in German laboratories, in 1926, where it could be utilized in industrial production on a large

scale. It is estimated that an acre of forest land can be made to yield as much sugar as an acre of ground planted to sugar beets, and the new process has the advantage of being carried out completely and continuously by machinery, without the employment of manual labor. Wood sugar is more like corn glucose



THE WORLD'S SWEET TOOTH

The diagram shows the average annual consumption of sugar per person in the five leading nations. The demand for candy in the United States greatly increased during the World War I decade.

than cane or beet sugar, being less sweet, though equally nutritious. The product of the German process comes out in the form of a grayish powder, containing ninety-five per cent sugar. This can be used directly as cattle food or can be purified for human consumption.

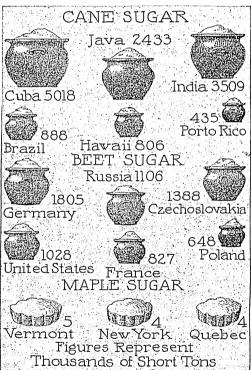
The process consists essentially in adding a molecule of water to each molecule of the cellulose of the wood pulp, which converts it into glucose. This operation is accomplished by treating sawdust with forty per cent of hydrochloric acid, in specially constructed containers made of acid-proof and heat-proof materials.

History of Sugar as a Commodity. Honey took the place of sugar in the days of the ancient Greeks and Romans. Sugar was produced in India as early as the first century, but it was hundreds of years before it was regarded as more than a delicacy or a medicine. When, in the eighth century, the Arabs conquered Spain, they introduced into that country the cultivation of sugar cane, which they had already brought over to Mesopotamia and Egypt, from India. By the close of the four-

teenth century, European traders, particularly the Venetians, were carrying on a profitable trade in sugar and spices obtained from the Orient, and when the New World was opened to exploration and development, sugar cane was one of the first plants to be propagated in the West Indies and other tropical regions of the Americas. Cane supplied most of the sugar bowls of the world until the nineteenth century, when the beet-sugar industry was organized on a profitable basis.

was organized on a profitable basis.

The people of the United States consume so much sugar that they have been said to eat their own weight of it. This is not an exaggeration, for the annual consumption per capita reached one hundred pounds within a decade after World War I. The total amount is about one-fourth of the world's supply. The country produces about twenty per cent of its sugar requirements, chiefly beet sugar from Colorado, Utah, Michigan, California, and a few other states. The output of cane sugar,



SUGAR PRODUCTION

The sources of the greater proportion of three kinds of sugar. Figures represent average production over a five-year period before world war II.

mostly from Louisiana, is far below domestic requirements, and raw cane sugar, refined in American mills, is imported in large quantities from Cuba, Porto Rico, Hawaii, and the Virgin Islands.

The world's production of beet sugar is, roughly, one third of the total amount of

Harvesting Sugar Cane. At the left is a cane field in Peru, where the work is nearly all done by men. At the right, the cane harvest in Jamaica, where women per-form a large part of the hard labor of the harvest.

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sugar produced, or approximately 20,000,000,000,000 pounds out of a total of 60,000,000,000 pounds. The leading beet-sugar countries are Germany, Russia, the United States, France, and former Poland.

A Booklet on Sugar

Cover—In center, title, The Story of Sugar; at bottom, name of pupil, grade, and school.

Illustrations: In lower left corner, sugar cane; in upper right corner, group of maple leaves.

Inside cover-Blank.

Page one—Essay, Making Cane Sugar. Illustrations: Broken cane stalks; cubes of loaf sugar.

Page two—Essay, Making Beet Sugar. Illustration: Heap of sugar beets.

Pages three and four—An original story, When We Made Maple Sugar.

Illustrations: Sugar maple; fire with kettle hanging above it.

Page five—Essay, Where Sugar Is Pro-

Illustration: Shaded maps.

Page six—Description of an experiment in crystallizing sugar (see article CRYSTALLIZATION).

Illustration: Drawing showing shape of crystals.

Page seven—Essay, Uses of Sugar.

Illustration: Sketches of various foods

Illustration: Sketches of various foods into which sugar enters largely.

Page eight—My Favorite Candy Recipe. Inside back cover—Blank.

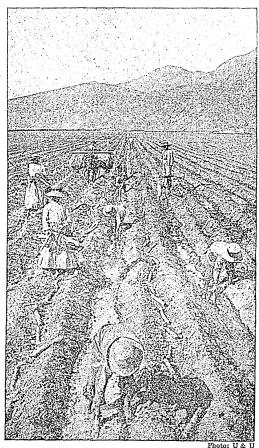
Back cover—List of all plants irom which sugar is made.

Chemical Formula. Sugar's formula is $C_{12}H_{22}O_{11}$; that is, a molecule contains twelve atoms of carbon, twenty-two of hydrogen, and eleven of oxygen.

Related Subjects. The reader is referred to:
Beet (Sugar Beets) Maple Saccharin
Carbohydrates Molasses Sugar Cane

SUGAR BERRY. See NETTLE TREE.

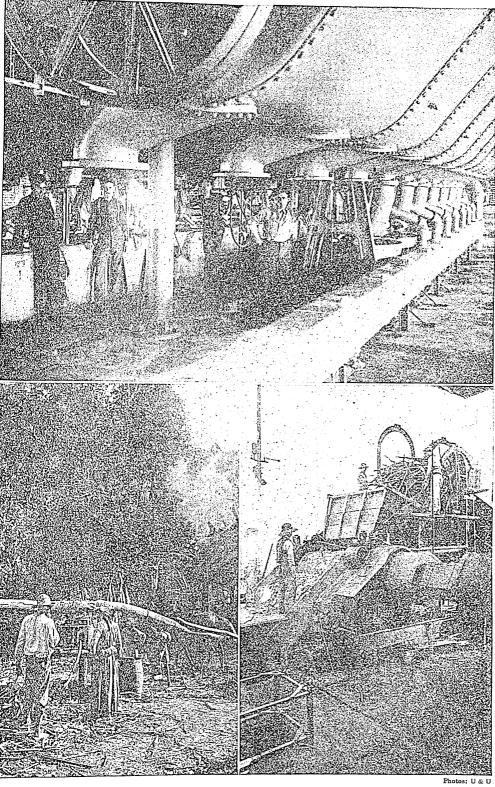
SUGAR CANE, a giant perennial grass cultivated in tropical and semi-tropical countries, the source of over half the sugar of commerce. Sugar cane gives off, from a thick, solid rootstock, numerous erect stems that grow from ten to fifteen feet in height and are from an inch to two inches in diameter. The stalk has no branches, but bears long and narrow leaves which are arranged in two rows. The stalk is divided into numerous short sections, sometimes sixty to eighty in number, which are connected by nodes, the sections between being known as internodes. Each node bears a small bud that looks very much like the eye of a potato. The color of the stem varies for different kinds of cane, some being yellow, others reddish, and still others green- and white-striped. Sugar cane flowers only in tropical countries, but even there some varieties never blossom. The chief sugar-cane regions in the world are Cuba, British India, Java, Porto Rico, the Hawaiian Islands, and the Philippines. Nearly three-fourths of all cane sugar produced in the United States is grown in Louisiana. Small quantities are produced in Alabama, Mississippi, Florida, and Texas. So great is the consumption of sugar by the American people that the domestic supply is never adequate for the demand, and large imports are received from the insular possessions and from foreign countries.



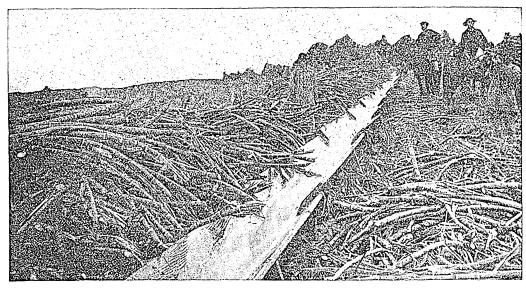
PLANTING SUGAR CANE

The photograph shows a scene on a plantation in Peru.

Growth and Cultivation. The soils best adapted to the growing of cane are those that have a high degree of fertility and are also capable of retaining a large amount of moisture. This plant requires an abundance of water, and if the rainfall is not adequate, excellent results are obtained by irrigation. A heavy subsoil of clay is of value in preventing the washing away of soluble plant food, especially where a considerable amount of irrigating is resorted to. The alluvial soil of Louisiana



The Manufacture of Sugar. In a Michigan beet-sugar mill (top illustration), sugar is separated from syrup in centrifugal machines. Below, at left, a crude method of cane grinding in Jamaica; at right, a cane-sugar mill in Peru. 6911



BY FLUME TO THE MILL

A scene in Hawaii. Cane is sent by flume to the mill wherever there is sloping land from the field and where the ground is too rough for vehicles.

(containing deposits of mud, sand, and gravel) yields splendid crops of cane, but there drainage is very important; in fact, almost essential. The soils of the Hawaiian Islands, which yield the heaviest crops of sugar cane in the world, are rich in lime, potash, phosphoric acid, and nitrogen.

Sugar cane is propagated for the most part by stem cuttings; seed is used principally for cross-fertilization and to produce new varieties, but not all varieties of cane bear fertile seeds. Planting may take place in the spring or fall, the latter when the spring and summer seasons are so short that spring planting might endanger maturing of the crop. If planted in the fall, the canes come up earlier, and earlier grinding is possible. A field prepared for planting has great furrows, from five to seven feet apart, running from one end of the field to the other. In these the cuttings are laid horizontally, sometimes singly and often two or three abreast. Some planters use only the upper portion of the cane for planting, some the entire cane. Others recommend planting only the matured portion. The upper portion is considered best for seed.

After the cuttings have been planted, soil is thrown over the furrows, until the cane is covered. In a short time, the buds borne on the nodes swell and burst, and a young stalk of cane emerges from the soil. Soon the leaves begin to appear, and in a few weeks the nodes and internodes may be seen. Cultivation should begin as soon as the cane has a good start, for the field must be kept free from weeds and grass. The upper part of the soil should be tilled frequently, and two or three

hoeings are also beneficial. The cane grows rapidly under favorable conditions.

Harvesting. Hand cutting of the cane has been found more satisfactory than machine cutting. On large plantations, scores of cutters are employed, each of whom is provided with a large steel knife carrying a blade five inches wide and eighteen inches long, and having on the back a small hook. As the cutters work their way down the long rows, they cut the cane close to the ground, stripping off the leaves with the hook, and topping the stalks at the last matured joint. The cut stalks are thrown into heaps called windrows, then gathered up into carts or rail cars, to be carried to the sugar factory. The stubble left in the field will produce a second or third crop in Louisiana, and from five to ten crops in tropical countries. Annual or biennial planting, however, is customary, as the fields ordinarily do not give profitable yields unless replanted frequently.

Scientific Name. The sugar cane plant belongs to the family Gramineae. Its botanical name is Saccharum officinarum.

Related Subject. For description of the process of extracting sugar from the cane, see the article SUGAR, where there is also an illustration of growing sugar cane.

SUGAR LOAF. See RIO DE JANEIRO, illustration.

SUGAR OF LEAD. See ACETIC ACID;

SUGAR OF MILK, OR LACTOSE. See CARBOHYDRATES.

SUGAR TROUGH. See GOURD.

SUGGESTION, sug jes' chun, the influencing of conduct by presenting a pattern for imita-

STATES TO SELECT THE STATES OF THE CONTROL OF STATES OF THE STATES OF TH

tion, or indirectly inviting a desired and natural reaction. It commonly carries the implication that the process is introduced unawares, without arousing the consciousness of the "suggested" person in the direction of the suggested response. The mechanism by which yawning is contagious is rather obvious; the sight of another yawning intensifies or releases slight tendencies in the same direction; the sight of others eating makes one hungry. When a lecturer, to illustrate the point, moves his hands open and shut, like a pair of jaws, and induces a yawn among the more responsive of his audience, the mechanism is a little more indirect.

The mechanism of suggestion in the way of inducing belief is equally important. This appears realistically in the psychology of con-juring (which see). When all the movements of throwing a ball into the air are performed. the spectator is convinced by the suggestion of the appearance that he saw the ball in the air (when actually it was dropped under a table); or, again, the spectator is convinced that coins are dropped into a hat by the tossing movements of the right hand (which is quite empty), when really the coin is dropped from the left hand, which holds the hat. The illusion—as is true of many illusions—is the result of suggestion. Similarly, an inference is drawn from a set of premises suggestively arranged; as in the methods of a criminal in establishing an alibi or covering up his tracks.

Suggestion refers also to the process of inducing consent without arousing opposition. Children must be guided by suggestion as often as by command. As soon as the will realizes that it is being led, it asserts its self-direction; suggestibility is a ready acquiescence, a will that yields easily to another's direction. It is along the same lines that an undesirable belief or a symptom is removed by suggestion; a sugar pill may be given as medicine with the suggestion that it will have a desired effect, and the effect follows; a mock operation may be gone through with, and the patient, convinced of a cure, finds himself rid of the trouble.

Suggestion as a procedure enters into the psychology of many practices (see Faith Cure; Hypnotism). Normal suggestibility has its limits; it must as a rule proceed cautiously and indirectly; abnormally, it attains almost incredible proportions, and may proceed openly and forcibly. The psychology of persuasion (as an example, Antony's oration over the body of Caesar) and the psychology of advertising must likewise study the subtler suggestive tendencies of the mind that influence action.

Auto-Suggestion. Since the usual meaning of suggestion is action through the influence of another, the term *auto-suggestion* refers to the adoption of the same technique, for the purpose of influencing behavior by yourself.

There is no real, only an apparent, contradiction in the term. For when you yield to an undesirable suggestion and become afraid in an epidemic of influenza, for example, because you are surrounded by timid people, you do not yield wholly; you still try to act sanely and reasonably. Moreover, if you counteract this suggestion of panic with the reflection that you cannot do anything but take precautions; that you cannot run away or hide from germs; that you, as a leader, should set an example of calm; and that, after all, you do not want to succumb to fear—all this is auto-suggestion. You are giving as well as receiving the suggestion; but it is not quite the same part of your mental organization that is giving and receiving.

So, similarly, you may be despondent about your health, and find yourself losing ground. A friend or a professional adviser comes, and insists that you will get well. To give you something to hold on to, that person prescribes a formula: "Day by day, in every way, I am getting better and better"; and you fall in with the scheme and improve. The autosuggestion is but the reinforcement of the idea suggested to you. After all, you accept a suggestion, whether you do so knowingly or not, and with or without resistance.

Auto-suggestion includes the technique of letting a suggestion lie around, so that it is likely to be seen and acted on, and accepted as though you were acting on your own initiative; that is like the forced card that the conjuror makes you take, though you think you made the choice. Auto-suggestion may act in an indirect way, and by appeal to subconscious mechanisms. But auto-suggestion more typically aims directly at coöperation. You try to train your subject to take matters in his own hands, to dismiss his fears, and give himself a self-treatment in courage. Thus again, suggestion and auto-suggestion have overlapping phases.

It is, however, more in frightening yourself than in getting rid of your fear that autosuggestion applies; and what is true of fears is even truer of ailments and other undesirable states of mind. Even in anger, which is more impulsive, you work yourself up into wrath; or you exercise calm and control, by suggesting to yourself that you must hold back and not let yourself go. When a patient has a peculiar sensation in the heart or the groin, and becomes convinced that he has heart trouble or kidney trouble, and in his concern looks up the subject in a medical book, then he is sure that he is so afflicted; you call it auto-suggestion, merely because a thought or a printed statement, and not some other person, made the suggestion.

If the patient speaks about his symptoms to a friend, and he puts that idea of heart

failure or kidney failing into his head, the process is different only because, while all of , us are social, some of us are quite dependently so, and follow social patterns and others' opinions more readily than our own; this means that we are easily suggestible. So M. Coué, the French exponent of auto-suggestion, was in many ways wrong, but in this respect was right: he always maintained that he did not cure people; he had no special power; he only helped them to cure themselves. Hence he called his method auto-suggestion. But, as a matter of fact, the prestige of his success helped many a patient who had done his best to auto-suggest himself into health, but without much success, to summon that additional power that sent him over the top to victory.

We are exposed to the influences of suggestion, both helpful and harmful, quite as generally in that private struggle that we are ever conducting in behalf of mental fitness, as in the social setting in which we look to others for help and guidance. In so far as socialized suggestion is the more frequent and effective, we are apt to think of suggestion as directed from without. Because we are gregarious (not solitary) animals, we are socialized in our responses, and because we are thus socialized, we are suggestible for good or bad. But since we are constantly exposed to all sorts of suggestions, and could not possibly respond to them all, the selection we exercise in determining what suggestions we shall accept, and what we shall reject, is typically present, and comes closer to the auto-suggestion formula.

It is when we have fallen into bad mental habits and are worried about our health, when we feel that we are not strong and need to lean on others, that we need help in our autosuggestive efforts. If auto-suggestion in the right direction is so weak because auto-suggestion in the wrong direction is so strong, such powerful resistance may need to be overcome by so drastic a method as hypnosis. When hypnotized, your resistance is put to sleep, and you are more completely at the call of the suggestion by another. The hypnotizer seemingly can mold you like clay, and you will find yourself, on awakening, in command of powers that you could not summon by yourself; you may then go on and continue in the path of auto-suggestion. This method has often worked well in cases of sleeplessness. The underlying principle and mechanism employed vary. Both terms serve a useful pur-

Relating to Various Beliefs. The articles on the following topics are of interest in this connection:

Alchemy Astrology Clairvoyance Conjuring

Demonology Divination Faith Cure Hypnotism

Magic Medium Mesmerism Mind Reading Necromancy Occult Palmistry Phrenology

Physiognomy Psychical Research Psychoanalysis Spiritualism Subconscious Superstition Telepathy Witchcraft

SUICIDE, su' ih side, intentional death by one's own hand. Attempts have been made to show that the tendency toward suicide is an accompaniment of civilization—that a savage never takes his own life. While the facts do not support this extreme view, it is true that it is much less common among barbarous than among civilized peoples.

Christianity has always opposed suicide, accounting it a sin; and statistics show that the deterrent effect of religion is very great. It is true that in practice the appeal of religion on this subject is not always to the highest emotions, but that it often deters through threats of punishment after death. Among Christian people, suicide is far more common with Protestants than with Roman Catholics. It is, however, less common among Jewish people than among Roman Catholics. In Japan, suicide under certain conditions is considered an act of honor (see HARA-KIRI).

Statistics on the subject of suicide are rather

meager and unsatisfactory, for there are usually reasons for secrecy regarding the facts in a case, and many instances of suicide are not so reported. There is, however, sufficient statistical material to show certain very marked tendencies, some of which seem almost unaccountable. That there should be differences in nationalities might be expected, not only on account of climate, but on account of national divergences of temperament; and these differences are very marked. Saxony, a division of the German republic, leads all other countries in relative number of suicides; Ireland has fewest, in proportion to population.

The difference between the sexes is also very marked, and the proportion varies little from year to year in different countries, approximately three or four males committing suicide to each female. The modes chosen by men and women vary, too, men choosing hanging or cutting most frequently, while women prefer drowning or poison. As to age, there are evident certain definite tendencies. In general, it may be said that the age at which women tend to commit suicide is much lower than that for men, pointing, doubtless, to a decided difference in cause. Among all classes, the maximum is reached between fifty-five and sixty-five.

Other facts shown by statistics are that single people commit suicide oftener than married people; that professional classes and military men show a far greater tendency toward self-destruction than do the laboring classes; and that the late-spring and earlysummer months, without exception, show more suicides than do the other months.

Though statistics are not exact enough to establish such a point beyond question, it seems that the propensity to commit suicide is increased by education. It is also true that suicide is more prevalent in urban than in rural districts.

At various times, laws have been passed which aim to serve as deterrents of suicide, but they are not effective; one knows that if he succeeds in his attempt at self-destruction, the law will be powerless.

SUISUN, soo e soon', BAY. See SACRAMENTO RIVER.

SULEIMAN, soo lay mahn'. See Solyman II.

SULFANILAMIDE. See SULPHANILAMIDE. SULGRAVE MANOR, a village in Northamptonshire, England, regarded as the ancestral home of George Washington. It was in the possession of the Washington family from 1538 to 1610, when it was sold by Robert Washington and his son Lawrence. The manor house was bought in 1914 by the British Commission for the celebration of the hundred years of peace between England and the United States. The large house is fairly well preserved. American patriotic societies assisted in the furnishing and restoration of the interior.

SULLA, Lucius Cornelius (138-78 B.C.), a Roman general and statesman, known as FELIX (THE FORTUNATE), and famous as the opponent of Marius. He was of patrician rank, received an excellent education, and entered the army, seeing his first military service of note in the campaigns of Marius against Jugurtha, in Africa. Here he was very successful, and he repeated his triumphs in the wars against the Teutones and Cimbri, which raised Marius to the height of his power. In 93 B.C., Sulla was made practor, in the next year went as governor to Cilicia, and on his return to Rome, in 91 B.C., did such excellent service during the Social War that Marius became intensely jealous of him. As a reward for his successes, he was made consul in 88 B.C. and entrusted with the conduct of the war against Mithridates, an honor which Marius greatly desired. The ill feeling between the two resulted in a riot, headed by the adherents of Marius, and Sulla was compelled to escape from Rome to his troops in Campania. At the head of his legions, he returned to Rome and drove out Marius.

From 87 to 83 B.C., Sulla was engaged against Mithridates, whom he at last forced to submit to Rome, and on his return found himself powerful, Marius having died during his absence. The Marian party, however, had still to be crushed, and this Sulla had accomplished by the beginning of 81 B.C.

He celebrated his victories by putting to death thousands of his enemies throughout Italy, instituting a veritable "reign of terror"; then he had himself declared dictator for an unlimited term. The laws which he promulgated were all directed toward the restoration of the powers of the Senate and the aristocratic party. In 79 B.C he resigned, and spent his last year in retirement.

Related Subjects. The reader may consult the following articles in these volumes:

Dictator Marius, Caius Mithridates Patrician Praetor Rome (Last Century of the Republic) THE REPORT OF THE PROPERTY OF

SULLIVAN, ANNE [Mrs. John A. Macy] (1866-1936), teacher of Helen Keller (which see).

SULLIVAN, SIR ARTHUR SEYMOUR (1842-1900), an English composer who won fame in the field of light opera and in sacred music, was born in London. His father was an Irish

bandmaster and music teacher of much ability, and the son so early learned the rudiments of the art that, at the age of eight, he could play any wind instrument. When he was twelve years old, he was admitted as a singer in the Chapel Royal at London, and two years later won the Mendelssohn scholarship at the Royal Academy of Music. Under this scholarship, he went to Leipzig Conservatory.



Photo: Brown Bros.

SIR ARTHUR SULLIVAN

In 1861 he returned to London, where, early in the next year, his music to Shakespeare's *Tempest* was played in the Crystal Palace. For some years he was organist at Covent Garden theater, London, and professor of composition at the Royal Academy, but after 1875 practically all his energies were devoted to collaboration with W. S. Gilbert in the production of their famous light operas.

His Principal Compositions. Sullivan accomplished the unusual feat of producing artistic music which was genuinely popular with the masses of the people. His earlier works, such as the Kenilworth Cantata, with its beautiful duet, How Sweet the Moonlight, and the songs from Shakespeare, such as Oh, Mistress Mine and The Willow Song, are universally admired, while the operas written with Gilbert, such as H. M. S. Pinafore, Pirates of Penzance, The Mikado, Patience, Iolanthe and The Gondoliers, became known around the world. It should not be forgotten that Sullivan also composed sacred music of a high standard. His Te Deum, The Light of the World, The Golden Legend, and his hymn, Onward, Christian Soldiers, are among the most notable specimens. His

musical setting of Adelaide Procter's Lost Chord has made that poem a universal favorite.

SULLIVAN, JOHN L. (1858-1918), American pugilist. See Prize Fighting.

SULLIVAN'S ISLAND, an island in the harbor of Charleston, S. C., and the site of Fort Moultrie (which see).

SULPHANILAMIDE, or SULFANILAMIDE, sulf a nil' a meed, one of a group of drugs, including sulphapyridine and sulphathiazole, obtained from coal tar. Their purpose is to destroy disease germs without harming the patient.

Sulphanilamide is used in fighting more than thirty different germ diseases, such as strepto-coccic infections, pneumonia, scarlet fever, malaria, and some heart diseases. It is also given to wounded soldiers to prevent death from infection. Sulphanilamide was first discovered in 1908, and was used in making dyes. Its value in treating diseases was not known

until twenty-five years later.

SULPHATES, salts of sulphuric acid. As a rule they are stable crystalline compounds, more or less soluble in water, with the exception of barium, strontium, and lead sulphates. Sulphates are very important. The following minerals-heavy spar, gypsum, celestite, and Epsom salt—are sulphates of barium, calcium, strontium, and magnesium, respectively. Copper sulphate, or blue vitriol, is used in a variety of industries, including dyeing and calicoprinting; iron sulphate is used in making ink and as a medicine; manganese sulphate is employed in calico-printing; zinc sulphate in surgery, in calico-printing, and in drying oils for varnishes. A double sulphate of potassium and aluminum, known as alum, is a constituent of some baking powders. Every sulphate contains a group of associated atoms of sulphur and oxygen.

Related Subjects. The following articles in these volumes should be read in connection with this subject:

Alum
Barium
Blue Vitriol
Calcium
Epsom Salt

Gypsum
Magnesium
Strontium
Sulphuric Acid
Zinc

SULPHUR, sul' fur, a common nonmetallic element. It is essential for the growth of plants and animals, and is used in most manufactured products. It occurs in many vegetables, such as onions, cabbage, and horseradish, and in eggs. The odor of rotten eggs is caused by a sulphur compound.

In earlier ages, sulphur was called brimstone (burnstone). It is found in a pure state in volcanic regions, and is widely distributed in combination with other substances, especially metals. With several of these, it forms valuable ores, such as pyrites, galena, blende, cinnabar, and stibnite. Calcium sulphate, or gypsum, is the most abundant mineral containing sulphur and oxygen.

Properties. Sulphur is a chemical element with the symbol S. It exists in several different physical forms, all identical chemically, and affording a good example of the property of allotropy (which see). Ordinary lump sulphur is a pale-yellow, crystalline, brittle solid, almost tasteless, and capable of giving out a peculiar odor when rubbed or melted. It is a poor conductor of both heat and electricity. It melts into a yellow liquid at the comparatively low temperature of 230° F., and possesses the peculiar property of becoming viscous or of solidifying, when heated to a higher degree. At about 482° F., the fluid is so thick that it cannot be poured from the vessel, but it becomes fluid again when the temperature is raised above that point. Sulphur boils at 832° F., emitting a yellowish-brown vapor, which condenses in closed vessels in the form of a fine, yellow powder called flowers of sulphur. The roll sulphur of commerce is made by pouring sulphur in fluid state into cylindrical molds, where it is cast.

Sulphur ignites readily at a low temperature, and burns with a pale-blue flame, forming sulphur dioxide, which is a colorless gas. Divided into very fine particles, it oxidizes in moist air and forms sulphuric acid. This process takes place in the atmosphere of large cities which burn a large amount of coal and gas for indus-

trial and domestic purposes.

Production. Formerly, Sicily was the chief source of the commercial supply of pure sulphur, but the United States now has the leading place in the trade. Texas is the chief producer. There are large sulphur deposits in Louisiana, but little development of the mineral is being carried on.

Uses. Sulphur is mixed with saltpeter and charcoal to form gunpowder, and is indispensable in the manufacture of rubber goods. Taken internally, sulphur is a mild laxative. Its occurrence in mineral waters gives them special value in the treatment of rheumatism. Sulphur baths are prescribed for eczema and other skin affections, and sulphur ointment is a cure for itch and ringworm. Sulphur is also employed to some extent in the manufacture of matches. In farm practice, sulphur preparations are widely used to kill insects and plant diseases. Sulphur and its compounds have so many uses, in fact, that it is impossible to enumerate them all in an article of this length. Sulphuric acid, for example, enters into the manufacture of fertilizer, alum, dyestuffs, explosives, and bleaching preparations, and is important in the electroplating, oil-refining, and mining industries. Sulphur dioxide is a bleach and disinfectant. By the action of calcium bisulphite on wood cellulose, paper pulp is made. Sodium thiosulphate is used in fixing photographs. This list could be indefinitely extended.

Related Subjects. The reader is referred in these volumes to the following articles:

Brimstone Paper Chemistry Rubbo Gunpowder Sulphi Insecticides Sulphi Minerals Sulphi

Rubber Sulphates Sulphureted Hydrogen Sulphuric Acid

Mineral Waters

SULPHURETED HYDROGEN, sul ret' ed hi' dro jen, or HYDROGEN SUL-PHIDE, sul' fide, a poisonous gas with the odor of rotten eggs, is a compound of sulphur and hydrogen. It occurs in mineral waters, and wherever organic compounds containing sulphur are decomposed, as in the air about cesspools and sewers. It is made in the laboratory by the action of hydrochloric acid on iron sulphide. The gas burns with a bluish flame, is colorless, has a sweet taste, and is slightly soluble in water. The solution reddens blue litmus, and when it decomposes, it deposits sulphur Dissolved in mineral waters. it has medicinal properties in rheumatism and skin diseases. Its most important use is as a reagent in the chemical laboratory, for analyzing other substances.

Chemical Formula. The formula for sulphureted hydrogen is $\mathrm{H}_2\mathrm{S}$; that is, a molecule contains two atoms of hydrogen and one atom ot sulphur.

SULPHURIC ACID, OR OIL OF VITRIOL, an oily liquid manufactured in great quantities for use in numerous industries. This acid is indispensable in the manufacture of explosives, artificial fertilizers, alum, nitroglycerine, glucose, phosphorus, and dyestuffs, and in the bleaching, electroplating, oil-refining, and mining industries. It is employed in the making of sodium carbonate (soda), which in turn is used in manufacturing soap and glass, and is an essential factor in the production of all other mineral acids. The manufacture of sulphuric acid is based upon the fact that it is formed when sulphur dioxide, the common compound of sulphur and oxygen, oxidizes in the presence of water. Its salts are called sulphates (which see).

When pure, the acid is colorless and odorless. It has great affinity for water, which it absorbs quickly from many organic substances. For this reason, it makes painful wounds if it touches flesh. In accidents of this kind, the acid should be washed off with water and the wound treated with sodium bicarbonate or limewater. Sulphuric acid chars wood, paper, starch, and sugar, and is often employed in the laboratory to dry gases, for it absorbs moisture from the air and from gases passed through it. Four parts of acid to one part of water raises the temperature of the water to boiling, and if the two are mixed, the acid should be poured into the water, not vice versa; otherwise, the containing vessel may be cracked by the sudden access of heat.

Chemical Formula. The formula for sulphuric acid is H_2SO_4 : that is, a molecule contains two atoms of hydrogen, and the radical SO_4 . The latter is a group consisting of one atom of sulphur and four atoms of oxygen, which remain in association, acting as one atom, in chemical reactions.

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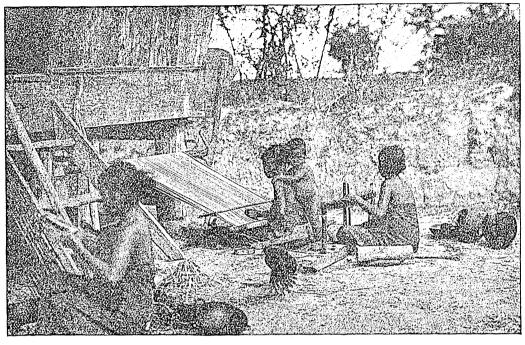
SULTAN, an Arabic title of honor, used since about A.D. 990, and applied to Mohammedan princes and rulers. The word means *emperor* in the modern sense, but more anciently referred rather generally to one who was mighty or imperious. The sultan of greatest dignity was the ruler of Turkey, prior to the new political order in the former Ottoman Empire; to set him apart as greater than any other bearing the title, he was officially known as *sultan khan*, or *reigning sultan*. The form *sultana* was applied to the mother, wife, or daughter of the sultan.

SULTE, suhlt, BENJAMIN (1841-1923), a Canadian poet and historian, author of Histoire des Canadiens-Français (History of the French-Canadians), an authoritative work. Sulte was born at Three Rivers, Que. After the death of his father, the son at an early age left school and had to work for a living. He drifted through various employments, until he finally entered the service of the Dominion government as a translator. This work he continued for thirty-five years.

Other Works. In addition to the solid eight-volume History of the French-Canadians, Sulte wrote Histoire de St. François du Lac (History of Saint Francis of the Lake), a history of Quebec, and two volumes of verse, Les Laurentiennes and Les Chants Nouveaux (New Songs). Many of his writings have appeared in journals and periodicals. See Canadian Literature (French Canada).

SULU ISLANDS. See PHILIPPINE ISLANDS (Some of the Islands in Detail).

SUMAC, or SUMACH, su' mak, a genus of small trees or shrubs of temperate regions, consisting of about 120 species, many of which are commercially important. Of the North American sumacs, one of the best-known is the staghorn sumac, whose range is from Southern Canada to Georgia and Mississippi. It is an attractive flat-topped tree, growing thirty or thirty-five feet high, and bearing fernlike leaves, small, greenish flowers, and tiny red berries. In the autumn, the foliage of this sumac is a wonderful combination of flaming scarlet, orange, and purple, but the summer leaf is velvety, dark green above, and pale beneath. The branches of the tree are forked many times; before it is mature, they are covered with a soft, velvety down. The fruit clusters and leafstalks are extremely hairy. From the soft, brittle wood are made walking sticks, and inlay work for boxes and ornamental objects. Not less attractive than the staghorn is the dwarf, black, or mountain sumac, found all over the Eastern United States and beyond



BATTAK WOMEN AND CHILDREN OF SUMATRA

The Battaks live in Northern Sumatra, and are semicivilized. In the illustration the women of the household are seen making the cloth necessary for the very limited amount of clothing needed by the family.

the Mississippi River, west to the Rockies. In the Tennessee and North Carolina mountains, it grows as tall as the staghorn, but is



STAGHORN SUMAC

usually a shrub. As its leaves are rich in tannin, they are employed in tanning leather, and from them is extracted a yellow dyestuff.

A sumac bearing white berries is found in swampy land from New England to Minnesota and from Georgia to Texas. This is the poison sumac, or poison elder, which all people should avoid. Like its harmless relatives, it is a tree of beautiful foliage, but can always be recognized by its fruit, which hangs in drooping clusters. The red berries of the harmless sumacs are in dense, erect clusters. There are several other poisonous sumacs, all of which are much alike in their effect upon the victim. The poison ivy (see Ivy), or poison oak has beautiful foliage, scarlet and orange in autumn, and bears white berries. In Japan, China, and the Himlayas, is found the varnish tree or lacquer tree, yielding lacquer, and the wax tree, used in making candles. Both are poisonous.

The *smooth-leaved sumac*, which usually grows only three feet high, is a species found east of the Rocky Mountains, from Arizona to British Columbia. The unripe summer berries are used in making a refreshing drink, and the bark, leaves, and fruit are used in treating fevers.

B.M.D.

amallad ahumas

[The name sumac was formerly spelled shumac, and is still often pronounced as if so written.]

Scientific Names. The sumac genus, Rhus, belongs to the cashew family, Anacardiaceae. The staghorn sumac is R. hirta; the dwarf, R. copallina; the poison, R. vernix; the smooth-leaved, R. glabra.

SUMATRA, soo mah' trah, the second largest island of the Sunda group, in the Indian Ocean,

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TYPES OF SUMATRA NATIVES

At left, a bride and groom of the Battak tribe. The brides among them either have their front teeth filed down to the gums or have them extracted, as every girl who marries must get rid of her front teeth. At right, a Sudanese chieftain in Southern Sumatra, with his family; the residence is in the background.

one of those rich Oriental lands which contribute their wealth to European owners and rulers. In this instance, the proprietor is the Netherlands. (See map, accompanying article PACIFIC ISLANDS.)

Lying across the equator, southwest of the Malay Peninsula, with an area of 163,138 square miles, Sumatra somewhat resembles California in shape, and has a population of 9,000,000 (1941 estimate), of whom only a few are white. Some of the native tribes are still savage enough to be troublesome; all of them are of Malayan and Hindu origin. The mountains are rich in minerals; the forests furnish teakwood, bamboo, and valuable gums; in the fertile valleys grow the pepper and tobacco of Sumatra's important European and Chinese trade. Rubber production is constantly increasing. Valuable petroleum fields are being exploited by capital from Great Britain, The Netherlands, and the United States. These industries led to the development of the great oil center of Palembang and the ports of Benkoelen and Padang. The capital is Medan. Europe first heard of Sumatra, through a Portuguese explorer, in 1508, and the first European trading posts on the island belonged to Portugal. In the seventeenth century, the British founded a colony on the southwest coast, but after a long period of rivalry with the Netherlands, which established colonies on the island in 1618, they withdrew in 1824.

The Netherlander governor-general, assisted by a council and the resident governors of the various districts, has absolute executive authority, except that he is responsible to the home government. In 1917 a legislative assembly, the Volksraad, with restricted powers, was established, and in 1925 an additional share of self-government was granted.

The Japanese invaded Sumatra in February, 1942, and completed its subjection by March 27. Although the Dutch had sabotaged many of the oil wells and refineries, the invaders were able to restore them within a few months. The gasoline stores enabled Japanese airplanes to continue their offensive in the Pacific. See EAST INDIES, DUTCH; WORLD WAR II.

SUMIDA, soo' me dah, RIVER. See TOKYO. SUMMERALL, CHARLES PELOT

), a distinguished officer of the United States army, and chief of staff, 1926-1930. He is the eighth man who, in the history of the nation, has held the rank of general. The

others were Washington, Grant, Sherman, Sheridan, Bliss, Pershing, and March. General Summerall was advanced to this rank in 1929.

His life is an example of complete devotion to a single pursuit-the army. He was born at Lake City, Fla., and at the age of eighteen was graduated from Porter Military Academy, at Charleston, S. C. In 1802 he completed the course at the United States Military Academy and, between that date and 1920, advanced



Photo: Wide World CHARLES P. SUMMERALL

through all grades of the service from second

lieutenant to major general.
Prior to World War I, Summerall conducted campaigns in the Philippines, and was with the China Relief Expedition in 1900-1901. He located and negotiated the purchase of several military reservations and field-artillery training camps, among them being those at Tobyhanna, Pa., Anniston, Ala., and Monterey, Calif. From 1905 to 1911, he acted as senior instructor in artillery tactics at West Point.

At the outbreak of World War I, Summerall was made a member of the military mission to England and France. In October, 1917, he joined the American Expeditionary Forces in France, as commander of the 67th Field Artillery Brigade. The following year he became commander of the First Division, Field Artillery. Some idea of the service he rendered may be gained from the many decorations which he received. The following is but a partial list: D.S.C. (U.S.), for gallantry in the Battle of Soissons; D.S.M. (U.S.), for meritorious and distinguished services as brigade, division, and corps commander; Legion of Honor and Croix de Guerre, with two palms (French); Grand Officer, Crown of Belgium; Commander, Order of the Crown (Italian); Military Medal (Panamanian); Order of Prince Danilo I (Montenegrin); Victory Medal of the United States. He was engaged in five major operations with the A.E.F. in World War I.

After the war, he was a member of the interallied military commission at Fiume, and served with the American mission to negotiate peace in that dispute. He retired from active service in March, 1931, and became president of The Citadel, a military college in South Carolina.

SUMMONS. See Courts (Court Procedure).

SUMNER, CHARLES (1811-1874), an American statesman of the period of the War of Secession, one of the most outspoken and fearless of the anti-slavery leaders. Lincoln spoke of him as "my idea of a bishop," because he so courageously denounced whatever he thought to be wrong. Sumner was born in Boston. After completing a course at the Harvard Law School, he was admitted to the bar (1834). Between 1837 and 1840, he traveled in Europe, and on his return home began actively to oppose the extension of slavery. In 1851 the Free-Soil party of Massachusetts, by combining with the Democrats, brought about his election to the United States Senate, and he remained a member of that body until his

Sumner's zeal as an anti-slavery teader led to an assault upon his person. In 1856 he de-

livered a fiery speech entitled The Crime Against Kansas, in which he severely criticized one of the Senators from South Carolina. In retaliation, a Southern Congressman, Preston Brooks, attacked him with a cane while he was alone in the Senate chamber, injuring him so seriously that for three years he was unable to appear in public life. Late in 1859, he resumed his



CHARLES SUMNER

place in the Senate. He was an ardent worker for enfranchisement of the negro, and he approved the impeachment of Johnson. He was one of the first to advocate civil service reform.

In 1872 Sumner joined the Liberal Republicans, whose candidate for the Presidency was Horace Greeley, for he disagreed with Grant on the latter's home and foreign policies.

SUMPTUARY LAWS. The word sumptuary, like sumptuous, comes from a Latin word meaning expense, and sumptuary laws are regulations to limit the amount of money spent on private luxuries. Modern political economy does not consider such laws legitimate, because they interfere with personal liberty; but the idea in the past was that, by checking extravagance, authorities could lessen poverty and crime.

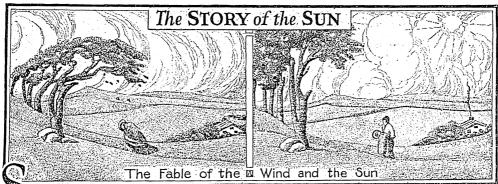
The sumptuary laws of ancient Greece and Rome forbade elaborate funerals, costly banquets, and gold and silver embroidery on women's robes; at one time, indeed, there was a Roman edict punishing guests as well as hosts, if the entertainment was more lavish than the laws permitted. Similar laws have been common at various times in England, France, Scotland, Spain, and Italy. From the time of Edward III until the Reformation, the English Parliament regulated the number of courses to a meal—two, except on holidays—and the dress expenditure for each class of society. Only the very wealthy might wear

silk, this restriction being intended, in part to encourage woolen manufacture in England.

The nearest approach to sumptuary laws the world has to-day is found in legislation covering the liquor traffic, such as license and prohibition laws. However, as their primary purpose is to protect public health and morals, they are generally considered as coming under the head of police regulations. See Blue Laws; Consumption (in economics); Prohibition.

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SUMTER, FORT. See FORT SUMTER. SUMTER, S. C. See SOUTH CAROLINA (back of map).

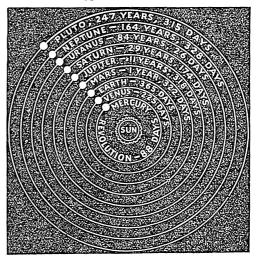


UN, the most conspicuous of the heavenly bodies and the center of the solar system, regarded by astronomers as a star, and believed to be a gaseous mass, with its atoms stripped of most of their electrons. The earth is dependent on the sun for heat and light; no form of life could exist on the planet we inhabit, if the influence of the sun were withdrawn. To us on earth the sun is therefore by far the most important object in our stellar system; in reality, though, it is only one of millions of stars, and not even one of the largest.

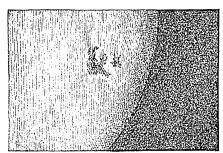
The Sun's Surface. All that can be seen of the sun by an observer on the earth is merely its shining surface, so intensely bright that the naked eye cannot endure to look at it. Astronomers call this shining surface the photosphere. A cloak, or envelope, of flaming hydrogen, surrounding the sun, is called the chromosphere, and shows red, like a burning mass, through the spectroscope. The prominences observable are vast clouds of hydrogen extending up from the chromosphere, thousands of miles high, beside which the earth would be but a speck. During eclipses, there may be seen a still more vast, luminous envelope, called the corona (see below).

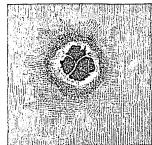
Size and Density. The diameter of the sun is approximately 864,000 miles, or 100 times that of the earth; its distance from the earth is about 93,000,000 miles. It would take fourteen years for sound to travel from the sun

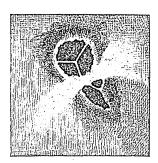
to the earth. If an explosion occurred on the sun and the sound could possibly travel so far, we should hear the explosion fourteen years after it had happened. The sun's surface area



REVOLUTION OF THE PLANETS
Comparative time required to revolve around the sun. is 12,000 times and its volume 1,300,000 times that of the earth. Since its density is 1.41 times that of water, it is much less dense than the earth, whose density is 5½ times that of water.







SUN SPOTS, REPRODUCED FROM PHOTOGRAPHS

At left, spots seen near edge of the sun. The second illustration shows a spot, rounded at first, finally becoming bridged over with projections, as seen in the third picture.

Gravity on the sun's surface is 27.9 times as great as on earth; a person weighing 150 pounds on earth would weigh nearly two tons on the sun, and a body falling onto the sun's surface would fall 450 feet the first second, while on the earth the fall in the first second would be 16.08 feet. On the sun's surface, if it were possible to get there, a human being could not lift hand or foot, but would probably be crushed by his own weight.

Apparent Motion. To dwellers on earth, the sun appears to move through the heavens. As a matter of fact, the earth moves round the sun, but we are unable to feel that motion.

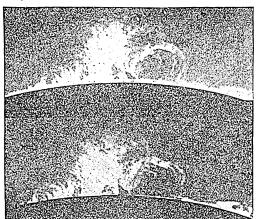


Photo: Visual Education Service

HYDROGEN FLAMES FROM THE SUN

In the spring, the sun rises a little farther north of east each day for three months in the northern hemisphere. At the summer solstice, it appears to stay at the same height for a few days, then starts on its journey southward. It not only moves north and south, but continually advances eastward among the stars, rotates on its own axis in twenty-five days, and completes a circuit of our heavens in a year.

Composition and Heat of the Sun. What is behind the photosphere and the chromosphere, what the sun consists of in its interior, is still more or less a matter of conjecture. If the sun is cooling, the process is so gradual as never to have been in the slightest degree noted. Since the earth has been inhabited, there has been time for the sun to burn itself out, if its heat were maintained by ordinary combustion. It is now considered possible that its heat may be maintained by the conversion of its mass into heat. If this is the correct explanation, the sun still contains enough heat to supply the earth for many millions of millions of years (in this connection, see STAR).

In the gaseous mass composing the sun are present iron, titanium, calcium, manganese, nickel, cobalt, chromium, barium, sodium, magnesium, copper, hydrogen, zinc, cerium, strontium, helium, carbon, nitrogen, oxygen, silver, tin, potassium, and a total of thirtytwo other elements. The amount of heat received by the earth from the sun in a year would melt a covering of ice 124 feet thick all over the surface of the earth, and if the rays from the sun could be all concentrated upon a bridge of ice 21/2 miles thick, reaching from the earth to the sun, the heat would be sufficient to melt that bridge in one second. Only a very small portion of the heat radiated by the sun reaches the surface of the earth, and the effect of this is greatly modified by the so-called "greenhouse effect" of the earth's atmosphere, which enables it to retain considerable of this heat. If the same face of the earth were always turned toward the sun, one-half would be always in the light and heat, the other half in perpetual darkness and cold.

Sun Spots. The surface of the sun appears to be dotted with dark patches, irregular in shape and varying in diameter from 1,000 to 50,000 miles. These are called sun spots, and it is observed that they become more numerous at regularly recurring intervals. Although apparently dark, sun spots are dark only in comparison with the rest of the sun's surface. In reality, the light of even the darkest of sun spots far exceeds limelight in brilliance. The brightest part of an electric arc light is the nearest approach to the light of the sun, but even that is not one-quarter as bright as the solar surface. It is, of course, quite impossible to examine sun spots with the naked eye. Col-

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SUN

The FACE of the SUN

BRIGHT SPOTS CLOSING IN AFTER ERUPTION

UMBRA

PENUMBRA

BRIGHT SPOTS

SUN SPOT DURING

"GRANULAR" VAPOR FORMATION

SUN SPOTS FORMING

CORONA

SPACE

ored or smoked glass screens should be used, to prevent the glare from damaging the eyes. The Carothers Observatory, Houston, Tex., has suggested the following method:

If images of the sun be formed through clean-cut, round holes of proper size in a darkened room, at sufficient distance from the aperture, and cast upon white paper or cardboard, sun spots of ordinary size may be readily seen on the image.

This would enable amateurs to note the progress of the spots across the solar disk, and to compile interesting records. By observation of sun spots which pass round the sun, the time of the sun's rotation is calculated. The spots are apparently not attached to the sun's surface, but float about somewhat as clouds do in

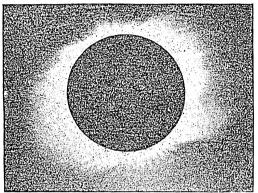


Photo: Visual Education Service

A CORONA

The irregularly luminous halo surrounding the sun can be seen and studied only during a total eclipse, and then for a period of from one to four minutes.

our atmosphere, causing differences in the calculated time of rotation, according to the latitudes on the sun at which the spots are located. Sun spots are believed to be vast whirling storms, something like tornadoes on earth, caused by the inflow of cooler gases from high levels. These spots are periodic in appearance, the average period being 11.5 years, but subject to wide variation. During the times of the greatest number of sun spots, called the maximum, from fifty to one hundred spots may be observed at once. Many weeks and even months may pass, however, without one being visible. A magnetic field exists in and about every sun spot, and it has been clearly established that, when the spots are most numerous, magnetic storms are frequent and violent on the earth. The majority of sun spots occur in pairs of opposite polarity.

It has also been determined that there are small fluctuations in the heat radiation of the sun with accompanying changes in the light radiation, and much larger changes in the ultra-violet radiation, all apparently connected with the activity of sun spots. The sun, in fact, is a variable star.

Solar Photography. In solar observation, as in all other branches of astronomy, photography has proved of the utmost value. Special appliances and lenses are, of course, necessary, the photographs being taken instantaneously. The pictures obtained are usually from two to eight or ten inches in diameter, but some of the best have been enlarged up to forty inches in diameter. In observations of sun spots, photographs are particularly valuable, as they record the position and shape of the spots exactly as they were at the instant of exposure, and not as they might appear to the human The Carnegie Observatory, on Mount Wilson, near Pasadena, Calif., is the bestequipped observatory in the world for the study and photographing of the sun.

The Corona. The corona, one of the most remarkable of nature's phenomena, is visible only during total eclipses, and then for a very few minutes. It composes the outer envelope, crown, or halo, of the sun. The inner portion of the corona is intensely bright, tapering in the outer corona to a soft, filmy light, with streamers spreading millions of miles. Photographic records made during the eclipse of 1937 proved conclusively that the corona is a huge globe, more than a million miles deep, and many times the volume of the sun.

Sunrise and Sunset Colors. The light from the sun, which we call white light, is really a combination of several different colors, and it appears white because all of the component colors act simultaneously on the eye. At sunrise and sunset, we are accustomed to see pearl, red, gold, pink, and other beautiful colors in the sky. These lovely hues are the result of the breaking-up of white rays, as they pass through the denser and dustier reaches of the atmosphere, with its clouds and masses of vapor near the horizon. This causes the white rays to be separated into their component colors. The longest rays—yellow, orange, and red—are the ones that most readily pass through the dispersing particles and objects, and they throw a brilliant picture on the sky. Dust particles are a principal cause of the dispersion of sunlight. See, also, Color.

The Sun in Literature and Religion. Literature of all ages contains strongly phrased reference to the sun and sun worship, though poets have sung more of the moon than of the sun. Among all savage nations, the sun has always been regarded as a god and worshiped with great ceremony. In the Teutonic language, the sun is feminine, being spoken of as she, while the moon is he. The Bible contains many allusions to the sun; Joshua commanded the sun to stand still and the moon to stay its course (Joshua X, 12). Some of the kings of Judah and Israel favored the worship of the sun, as practiced by the heathen dwelling round about them (II Kings XXIII, 5). Sun worship is still adhered to in India and China, and has only recently been abandoned among the Indians of North America.

In the famous Bedouin Love Song, by Bayard Taylor, the following lines occur:

> Till the sun grows cold And the stars are old.

Byron thus addresses the sun in virile figure of speech:

Thou material God! And representative of the Unknown

Who chose thee for his shadow. Thou chief star!

An expression that has become a classic of brevity throughout the world is the practical philosophy of Cervantes, author of Don Quixote, who advises in homely figure to "make hay while the sun shines."

Related Subjects. The following articles in these volumes will give further information on the subject of the sun:

Astronomy Precession of the Corona Equinoxes Earth Satellite Eclipse Solar System Ecliptic Solstice Equinox Star Sun Dance Gravitation Nebular Hypothesis Sundial Sunstroke

SUNAPEE, sun' a pe, LAKE, in southwestern NEW HAMPSHIRE (see colored map).

SUN BATHS. See HELIOTHERAPY.

SUNBIRD, the common name of a group of tiny tropical birds of Asia and Africa. They correspond to the humming birds of the New World, which they resemble in size and in the gay color of the male plumage. They are not so small as the humming birds, however, and their bills are curved instead of being straight. While they feed to some extent on flower nectar, their fare consists chiefly of the tiny insects that frequent the flowers. The sunbirds belong to the family Nectariniidae.

SUNBURY, PA. See PENNSYLVANIA (back

of map)

SUNDA, OR SOENDA, ISLANDS, two groups of islands in the East Indies, extending from the Malay Peninsula to the Moluccas. The Great Soenda Islands consist of Sumatra, Java, Borneo, Celebes, Bangka, and Billiton; the Little Soenda Islands are Bali, Lombok, Soembawa, Flores, Soemba, and Timor. With the exception of part of Borneo, they are under the rule of the Netherlands. The islands are extremely productive, and carry on a large commerce in spices, fruits, copra, rice, coffee, cocoa, tobacco, and sugar.

See Asia (map); see also World War II (map, The War in the Pacific).

Related Subjects. The following articles in these volumes will give further information on the Soenda Islands:

Tava Borneo Sumatra Celebes East Indies, Dutch

States government, because of the fearful tor-

SUN DANCE, a religious ceremony once practiced by the Plains Indian tribes of North America, but now almost unknown. In most places, it has been suppressed by the United

tures that sometimes accompanied it. ceremony was held once a year, in summer or early autumn, and usually lasted eight days, the first three or four days being devoted to preliminary rites. Each tribe had its special reason for organizing the dance, but it was always believed to benefit the tribe. Sometimes it was held in fulfillment of a vow made to the sun god. The members of the tribe would arrange their tepees around a central medicine lodge, with an opening toward the rising sun. Decorations covered the center pole, around which the participants, who were stripped and painted, danced. The rites accompanying the ceremony were often very elaborate, and in all cases they had a special meaning.

SUNDAY, among Christian nations the first day of the week, the day set apart for rest and public worship of the Deity. Among the old Teutonic peoples, it was originally sacred to the sun, and its name has remained unchanged. Among the Latin nations, however, it became known as the Lord's Day, dies dominicus, from which the modern names dimanche (French), domingo (Spanish), domenica

(Italian), etc., are derived.

In the earliest days of the Christian Era, the status of the Christians was such that they had to work every day in the week, and there is no evidence that Sunday was at first regarded as a day of general rest. It was, however, set apart for worship. About the middle of the second century, the Church fathers began to discuss the question of forbidding work on Sunday, but it was not until the fourth century that Church and State officially recognized

the day as a day of rest. Some of the states of the Union have laws regulating or prohibiting Sunday labor, and a few regulate Sunday amusements. See Blue Laws; Week.

SUNDAY, WIL-LIAM ASHLEY (1863-1935), an evangelist and former baseballplayer, known throughout the United States as "Billy" Sunday. He was born in



WILLIAM A. SUNDAY

Ames, Ia., a posthumous child, for his father was killed in the War of Secession, before William was born. A part of his childhood was spent in a soldiers' home; then he went to high school and to Northwestern University for a time. From 1883 until 1890, he played baseball on the Chicago, Pittsburgh, and Philadelphia teams of the National

After his conversion, about 1890, Sunday served as assistant secretary of the Y. M. C. A. in Chicago, and then began his evangelistic work. In 1903 he was ordained a Presbyterian minister. He began to preach the gospel of clean living, and by his evangelistic revivals won followers by the thousands. His speech, although slangy and crude, was not vulgar.

SUNDAY SCHOOLS, once best known as BIBLE Schools in Europe, are instituted in connection with churches for the encouragement of Bible study, especially among young people. They are the outgrowth of a movement that began late in the eighteenth century, and are hardly older than the American

republic.

The movement was inaugurated by a benevolent publisher of Gloucester, England, named Robert Raikes (which see). Moved by the forlorn condition of the children of the poor in his town, he conceived the idea of gathering them together on Sundays and of hiring women to teach them. His first so-called "Ragged School" was started in 1780. The interest shown by the children, and the good accomplished, more than justified the experiment, and when such workers as John Wesley and George Whitefield, and even the queen herself, gave their support to the work, the movement spread rapidly. When Raikes died, in 1811, there were about 400,000 children in Sunday schools. Today, the Sunday schools enroll 37,285,519 (1936) students.

In America, the Methodists began the organization of Sunday schools on a definite plan soon after the Revolutionary War, and other denominations followed their example. In 1824 a voluntary union of Christian workers of different denominations was organized in Philadelphia, under the name of the American Sunday School Union. Through missionary workers, sent to all parts of the United States, this organization established thousands of

In the year 1872, American Sunday schools of all denominations began using a uniform system of lessons, designed to complete the study of the Bible in six years. This movement became international in 1875, and in 1889 it became world-wide. The organization which publishes the lessons is known as the International Sunday School Association. In recent years, the need of a graded system of lessons has been felt, and in many Sunday schools this idea has been successfully carried out. A wellorganized school is divided into different departments, each having its own superintendent. The pupils are arranged into classes according to age and mental capacities, much as in the secular schools, and each department has a course of lessons especially adapted to the pupils of that division. Other features of modern Sunday-school work are classes for teachers, Sunday-school workers' institutes, conventions, and circulating libraries.

Religious instruction in the Roman Catholic Church is given to all children who attend the parochial schools, and those who do not attend them are required to attend Sunday classes.

SUNDERLAND, ENGLAND. See ENGLAND

(The Cities).

SUNDEW, sun' du. The sundews are a genus of interesting bog and marsh plants belonging to a class of plants that entrap and



THE SUNDEW

digest insects (see Carnivorous Plants). The name refers to drops of sticky fluid secreted by glands on the leaves; in the sunlight, these glitter like drops of dew. The round-leaved sundew, which is distributed in moist places over the northern part of the United States, and from Labrador to Alaska, is a representative species. The slender stem of this plant, often about five inches in height, is topped by small white flowers occurring in rows, while at the base of the stalk, springing from the root, is a rosette of rounded leaves. The upper surface of each leaf is covered with gland-bearing hairs, each gland being the center of a drop of the sticky liquid. an insect alights on a leaf, it becomes entangled in the fluid, the filaments with which it is in contact bend, and the victim is passed from one set of hairs to the next, as the leaf curls in, until the captive is in the center of a cupshaped receptacle. Here it is drowned in the secretion, and portions of its body are subsequently digested and absorbed.

Scientific Names. The sundews form the genus Drosera in the family Droseraceae. The round-leaved species is D. rotundifolia.

SUNDIAL, the oldest device known for the measurement of time. The earliest mention of it is in the Bible (*Isaiah* XXXVIII, 8):

Behold, I will bring again the shadow of the degrees, which is gone down in the sundial of Ahaz, ten degrees backward.

The probable date of the sundial above referred to is about 700 B.C. The earliest sundial of whose construction there is certain knowledge is the dial of Berossus, a Chaldean astronomer who lived about 300 B.C. This dial was a hollow hemisphere, set with its rim horizontal, and with a small bead fixed at the center. The shadow of the bead, during the sun's progress from east to west, described a circular arc. This arc was divided into twelve equal parts. The dial, as a consequence, divided the day, from sunrise to sunset, into twelve equal parts, which were called temporary hours, for their length varied with the seasons.

About the year 1400, the introduction of clocks and other mechanical devices for measuring time made necessary the determination of equal hours. By the end of the eighteenth century, the use of sundials was practically discontinued, though many still serve as ornaments or are preserved as relics.

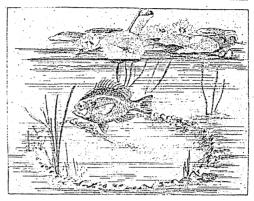
A sundial is composed of two parts, the dial face, or plane, and the stile, or gnomon. The dial face is divided into quarters, and the dial must be set so that the dividing lines run toward the four points of the compass. The dial is further marked into hour spaces, with divisions of halves and quarters. The gnomon is a flat piece of metal, set in the center of the dial and pointing toward the North Pole. On sundials used in the southern hemisphere, the gnomon must point to the South Pole. See illustration, page 6928.

SUNFISH. There are several kinds of fish to which this name is applied. In North America, the sunfish are a group of small, bright-colored food fish, rarely over ten inches long. An interesting fact in regard to their coloration is that it changes according to conditions of health, food, and temperature. The common sunfish, or sunny, is found abundantly in brooks and ponds from Maine to Florida, and in the northern part of the Mississippi Valley. It has a roundish body and there is considerable orange in its coloration, so that the name given it by young anglers-"pumpkin seed"—is very appropriate. This fish is about eight inches long and weighs from six to eight ounces. Boys enjoy angling for it, because it bites with so much vim. Other species are the red-spotted, long-eared, and copper-nosed.

The name sunfish is also given to a group of grotesque-appearing ocean fish which have the habit of resting on the surface in sunny weather, with one fin above the water. The body is scaleless, dull-colored, and clumsy, that of one species seeming to consist of one great head

with small fins. They may weigh as much as 250 pounds. Ocean sunfish are never used as food. The fresh-water and marine sunfishes are not closely related; they belong to different suborders.

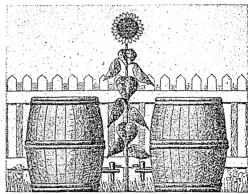
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THE SUNFISH
The male is guarding the typical circular nest.

Scientific Names. The "pumpkin-seed" is Eupomotis gibbosus. The red-spotted, long-eared, and copper-nosed sunfish are species of the genus Lepomis. Ocean sunfish belong to the family Molidae. The common Atlantic species is Mola mola.

SUNFLOWER, a flowering plant of the composite family, so named because of the great flower head, with its encircling rays of

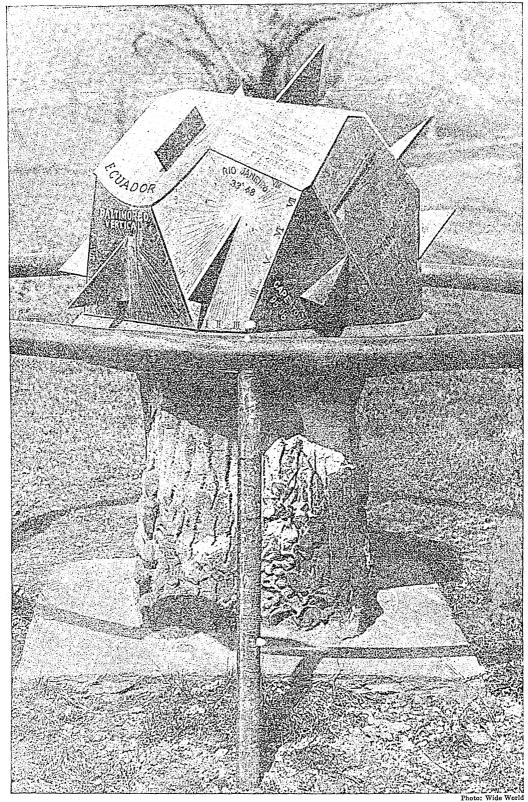


SUNFLOWERS REQUIRE MUCH MOISTURE Each plant, in order to reach its fullest possible growth, must have two barrels of water to nourish it.

gorgeous yellow petals. James Montgomery's poem to the flower contains these lines:

Eagle of flowers! I see thee stand, And on the sun's noon-glory gaze; With eye like his, thy lids expand, And fringe their disc with golden rays.

One of the best-known of several species is the annual garden sunflower, which under cultivation bears flower heads a foot in diameter. These heads are flattened discs, surrounded by circles of florets. The outer circle in each head is a row of large, yellow petals which seem al-

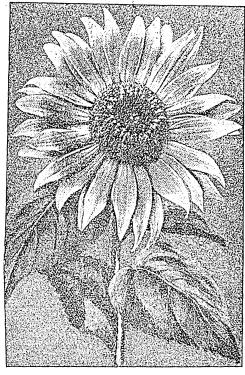


A Very Interesting Sundial. This device is declared to tell the approximately correct time in all the principal cities of the world during their daytime periods. Those shown in deep shadow are in the dead of night.

6928 The dial stands in Druid Hill Park, Baltimore. (See article, page 6927.)

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ways to be turned toward the sun, and from it to draw their bright color. The other florets, which form row after row of concentric circles, are small, tubular flowers. The plant has a rough, hairy stem from six to ten feet high, and coarse, heart-shaped leaves. Numerous leaflike bracts surround the disc, thus functioning to protect the more delicate parts of the flower.



... the sunflower turns on her god, when he sets, The same look which she turned when he rose.

--- Moore: Believe Me, If All Those Endearing Young Charms.

Some of the perennial species are excellent plants to cover walls and fences. Sunflowers are also grown for their seeds, which are used as food for cattle and poultry. In some sections of Europe, the stalks are used as fuel and the seeds are eaten as nuts. Of more recent date is the use of the plants for silage crops.

Scientific Names. Sunflowers belong to the family Compositae. The common annual species is Helianthus annuus. Among the decorative perennials are H. orgyalis and H. decapetalus.

SUNFLOWER RIVER, a tributary of the Yazoo River in Mississippi.

SUNFLOWER STATE, one of the popular names applied to Kansas (which see).

SUN MOTOR. See Solar Engine. SUNNITES. See Mohammedanism.

SUNNY. See SUNFISH.

SUNSET STATE, a popular name applied to Arizona (which see).

SUNSHINE STATE, a popular name applied to South Dakota (which see).
SUN SPOTS. See Sun (Composition and

SUNSTROKE. This term has been applied to two different ailments resulting from overheating of the body. As the remedies for these ailments are entirely different, they should be very carefully distinguished. The more serious condition is known also as heat stroke and heat fever. It usually comes on quickly. The victim has a sense of burning heat all over the body; he becomes dizzy, cannot see clearly, and grows nauseated and faint; then he falls unconscious. The skin becomes burning hot and red, and there may be delirium, vomiting, and diarrhoea. The temperature will rise to 108° or more, in some cases as high as 115°. Such strokes may attack persons who have not been in the sun at all, but who are shut in hot rooms where the air has become foul.

The first thing to be done with a victim of sunstroke is to cool the body, by putting the subject in a cold bath or wrapping him in cold, wet sheets. Ice may be applied to the head or body or both. The application of cold must be continued until the temperature, as taken by a thermometer in the rectum, falls to 102° and remains below that level. The use of electric fans is of service, in both heat stroke and heat exhaustion. Water may be given, but under no circumstances should any stimulant be administered, as stimulants warm the body. It is always wise to call a physician, but if one cannot be found, no time should be lost in getting the victim cooled. Should a boy on a fishing expedition in the woods suffer from heat stroke, his companions should roll him in the river without delay.

Deaths from sunstroke are numerous in large cities during very hot spells, but many fatalities would be prevented if people would be more careful about eating and drinking. Excesses of any kind should be avoided, but

indulgence in alcoholic liquors, especially.

Heat Exhaustion. This is the term which is applied to the milder ailment. In this case, the pulse becomes feeble, and the patient feels exhausted and is faint, but is not necessarily prostrated. The skin, instead of becoming burning red, is white and clammy. If the attack is severe, the subject will lose consciousness, and the temperature will fall below normal, perhaps to 95°. Recovery, however, is usually a matter of a short time, the chief remedies being rest and stimulation. Cold is never applied externally, except that a cold cloth may be placed on the head. Tea, coffee, or aromatic spirits of ammonia should be administered, or, if nothing else is at hand, a small quantity of whisky or brandy in a large quantity of water. If the case is unusually bad, a warm bath may be given.

SUN YAT-SEN, DR. (1867-1925), leader in the formation of the Chinese Republic and its first provisional President. He was born in Kwangtung province, of native Christian parents. After his graduation from the College of Medicine at Hong Kong, he practiced his



Photo: Wide World

SUN YAT-SEN AND HIS WIFE

Since the death of the great leader of the Young China party, Mrs. Sun Yat-Sen has been almost idolized by the people.

profession at Canton, but soon showed more interest in politics than in medicine. From 1895 until after the revolution of 1911, he was an exile because of his connection with an attempted revolt.

In 1912, less than two months after his election as provisional President, Dr. Sun relinquished his office to Yuan Shih-Kai, in the interests of harmony in the new republic. Differences between the two leaders increased, but in 1916 Yuan died, and the following year Dr. Sun declared himself the head of South China, a newly formed republic, although he did not retain the position long. In 1921, however, he was recalled, but again his inability to coöperate, and his feverish ambition, which urged him to expand into Northern China before his work in South China was well established, caused him to be exiled. In 1923 he became chief executive of Kwantung and

remained in that position until his death. In 1929 his body was interred in an elaborate memorial building in Nanking. See China (History).

SUOMI, the Finnish name for Finland (which see).

SUPERHETERODYNE. See RADIO COM-MUNICATION (Glossary of Radio Terms).

SUPERIOR, LAKE, the largest body of fresh water in the world, and the deepest, most elevated, and most northwesterly of the five Great Lakes of North America. It lies between Ontario on the north and east, Wisconsin and Michigan on the south, and Minnesota and Ontario on the west. Its maximum length from east to west is 412 miles, and its greatest width is 167 miles; the area, 31,820 square miles, is a little greater than that of the state of South Carolina. Lake Superior has a maximum depth of 1,290 feet, and is 602 feet above sea level. About two hundred rivers pour their waters into it, the largest of which, the Saint Louis, at the western end, is the most remote headstream of the Saint Lawrence. Isle Royale (which see), about eight miles from the international boundary between the United States and Canada, is the largest of its islands and is a part of Michigan; others of importance are Saint Ignace, Grand, Manitou, Michipicoten, and the Apostle group.

Lake Superior, for the most part, has a bold and rocky coast line. In some places, especially on the north shore, there are steep cliffs rising abruptly from the water's edge to heights of several hundred feet; the Michigan shore is diversified by the famous sandstone walls known as the Pictured Rocks. The lake basin is a huge rift in a region rich in copper, iron, nickel, and other ores. The waters of the lake



LAKE SUPERIOR

The small corner map shows the location of Superior with respect to other members of the group of Great Lakes.

are unusually pure, and they abound in whitefish, sturgeon, and trout. Because of its depth, the lake never freezes over, though ice forms along its border and in the bays.

This fresh-water lake is an important link in the greatest water highway of North America. It discharges at the eastern end into Lake Huron, by way of the Saint Mary's River. There is a difference of over twenty feet in the levels of the two lakes, and at the drop from Lake Superior to the river, where there is an impassable series of rapids, there have been built the famous locks of the Sault Sainte Marie Canals. One may travel by water from Duluth, at the western end of Lake Superior, to the Atlantic Ocean. The chief cities on the lake are Duluth, Minn.; Marquette, Mich.; Superior and Ashland, Wis.; and Fort William and Port Arthur, Canada.

Related Subjects. See Great Lakes, for chart showing comparisons of the five Great Lakes with respect to size, elevation, and depth. See, also, Sault Sainte Marie Canals.

SUPERIOR, Wis. See Wisconsin (back of map).

SUPERLATIVE DEGREE. See COMPARISON.

SUPERMAN, THE. See NIETZSCHE, FRIEDRICH WILHELM.

SUPERNATURAL. See Occult.

SUPERNATURALISM, in religion, the belief that there is an agency above the natural. It is based on man's instinct to look to a power higher than himself for care and direction, an expression of which is found, for example, in the words of the Greek poet Homer:

As young birds ope the mouth for food, So all men need the gods.

An example of modern supernaturalism is the acceptance of the revelation and miracles of the Bible. It is opposed by *rationalism* (which see).

SUPERSTITION, su pur stish' un. Superstition represents a phase in the history of thinking. The most difficult art that man has had to learn is the art of reasoning. He has learned it very slowly, very imperfectly. Primitive habits of thought, childlike inclinations to believe, yet persist; such tendencies are responsible for the continuance of superstition. The contrast to, and the remedy for, superstitious thinking is scientific thinking. In these days of general education, every one knows a considerable mass of facts and of the relations of cause and effect, which science has established by observation, proof, and insight into principles or laws of nature. Every one's mind has been drilled and formed by some measure of scientific thinking. But outside this limited range—and even within it—all sorts of notions are held which are more closely related to superstition than to science.

Among the relatively uneducated masses, the tendency to cling to the earlier, simpler habits of belief is strong; it was far stronger when education was confined to the elect, and even they were imperfectly freed from unscientific notions and practices. Because science has illuminated so fully the facts of physics and chemistry, of biology, physiology, and the rest, and initiated men into the scientific point of view, the outgrown beliefs and

systems of past ages seem strange, and the practices curious and absurd. But in milder form, in less serious directions, we may sympathize with the feelings that led to such beliefs and practices. Superstitions reflect an attitude of mind, a way of thinking about the happenings and relations of the world; that mental habit—pernicious at worst, uncritical at the best—plays an important part in the regulation of human conduct.

The Strange and Unknown. A reason or explanation satisfies curiosity, but its more practical end is to guide conduct. The strange, the unknown, induces fear and uneasiness. Understanding makes for mental adjustment. As events are understood, man becomes at home in the world of happenings; he anticipates, prepares, and in some measure controls his fate. But his questionings go beyond this immediate purpose; his curiosity is always asking: Why? The history of early science and of superstition shows what kinds of answers were satisfactory in the childhood of the race.

Foretelling the Future. The most general interest of inquiry is to read the signs of events and foretell the future. Such foresight or insight was regarded in primitive communities as a gift, a privilege of the elect; the predecessor of the man of learning was the priest. medicine man, soothsayer, and wonder-worker. He professed to know the ways of nature and the mystic forces that control destiny, including, especially, the spirit forces which all primitive religions recognize. In more established societies, he may be, like Joseph, an interpreter of dreams; for dreams come from the unseen world and bear upon the personal fate of the dreamer. The Romans had professional augurs; by the flight of birds, or by the appearance of the entrails of sacrificed animals, by omens of sky, and by everyday incidents, they decided when the signs were favorable for battle, for alliances, expeditions, or the personal fortune of king or leader. The Delphic oracle and the Cumaean sibyl illustrate the religious aspect of this function; for science and religion develop together, just as, in primitive societies, the priest, the wise man, and the diviner are one. Through him as a medium, the gods are implored to prevent storms or plagues, to bring good crops and successful There may be an alliance with enterprises. evil spirits as well as good ones; the sorcerer's power may be feared as well as respected. He has to do with the reading of omens, the telling of fortunes, the preparation of charms, the cure of disease, and the protection against enemies. The world in which he exercises his art is dominated more by fears than by hopes, for unseen dangers and evil spirits are constantly threatening. The reading of signs and control of fate by charms and countercharms most amply illustrate the setting in which

superstitions flourish. The tendency to believe and to be influenced by such practices is the superstitious bent. In surveying the varieties of superstition, we may observe the motives that prompt belief-always some strong desire or fear; the means, that is, the practice followed, usually in relation to a set of principles or a system of interpretation; and the basis, in observation of reasoning that supports it. Thus viewed, superstitions, though fanciful, cease to be arbitrary, and often acquire an interesting history; they become specimens

in the museum of thinking.

Ascribing Motives to Nature. Underlying the notion that gave rise to the practices of divination and magic is the belief that events occur for their personal significance. The outer world and its happenings are interpreted in human terms. Nature is supposed to act with motives similar to human motives. A storm is thus regarded as the revenge of an offended god; a plague is a dire punishment for transgression of some sort; success will be the reward of generous sacrifices; and good luck will result from the observance of minute prescriptions. Still more generally is the setting of nature interpreted as bearing upon personal ventures and fortune. In this type of reaction to their environment, men have found the sky the most impressive object of contemplation; it becomes the symbol of the great beyond and the dwelling place of the mighty powers that control. It invites worship and awe. The sun, moon, and stars, with their regular, yet mysterious, changes; clouds, rain, wind, lightning, thunder; night and day, seasons, weather—these condition human enterprises. Out of this close relation arose the oldest of the sciences (astronomy) and the most widespread of super-stitions. It should be proper to speak of all such notions as astrological, though astrology refers usually to the system in its elaborate form, as practiced from ancient times to within a few centuries. The notion that the stars are connected with human destiny is the underlying one. The heavenly light of a star in legend is associated with the birth of Confucius, as well as of Moses and of Jesus, with the birth of the Caesars of Rome or the mighty of the earth; Napoleon seems to have had a sincere belief in his star of destiny. No less astrological is the belief that, when momentous human events are to occur, portents are seen in the sky as on earth; when Rome was threatened, the earth trembled, volcanoes broke forth, lightning bolts flashed, the heavens were obscured. In some minds, a comet still strikes dismay, as a sign that the end of the earth is approaching.

The Horoscope. Astrology shows the close relation of science and superstition. Important facts relating to the sun and moon, the stars and planets, were gathered under the motive of studying the celestial influences upon human life. Only three hundred years ago, Kepler, the most scientific astronomer of his day, practiced astrology. Though he spoke of astrology as the foolish daughter of a wise mother (astronomy), he had a measure of faith in the horoscopes which he cast, and by which he earned his living. Astrology is a system of divination (which see) requiring astronomical data; the horoscope which predicts the fortune of the individual, by reference to the position of the heavens at the time of birth, is the most elaborate product of superstition that the hu-

man mind has devised.

It is not easy for our minds to follow or state its basis. We can understand the exercise of the imagination by which the planets, stars, and constellations received names; these names were those of the gods of mythology, who in turn were accredited with certain powers and attributes. Again, some of the constellations were named in fancied resemblance of their outlines to the shapes of animals, and these animals, too, have qualities. Also, the movements of the heavenly bodies bring about changes of position—rising and setting, opposition, and conjunction. Out of this elaborate set of relations, a zodiac is formed and prediction begins. Mars is the name of a planet and of the god of war; Venus is the name of another, and of the goddess of love. Jupiter has one disposition, and Saturn another. Consequently, according to this system, a child born under the ascendancy of Mars will be violent and pugnacious; one under the dominance of Venus will be given to ardent love affairs: those at whose hour of birth Jupiter presided will be jovial (for jovial, derived from Jove-Jupiter-is an astrological word); and those with like relation to Saturn will be saturnine, or morose and gloomy in disposition. child born under the sign of the lion will be courageous, but one under the crab will not go forward in life; one born under the waterman (aquarius) will be drowned"; and so on. All this was believed merely because the arrangement of certain stars suggested the shape of a lion, and the lion is a bold, courageous beast; another, the shape of a crab, which has the habit of walking backward; a third, that of a water carrier, and in water one may drown. No other attempt—at least none with so ancient and influential a history-to bring together in the way of cause and effect the most remote happenings and relations, is quite so far-fetched and extravagant. But that kind of reasoning underlies many systematized superstitions and loose beliefs. Such argument is called an analogy, in this instance a most feeble, remote, and fanciful one. Pretentious systems like astrology may be called pseudosciences, because they attempt to build up a body of doctrine after the manner of a science,

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upon a basis that is entirely, or largely, akin to superstition.

Everyday Superstitions—Survivals of Astrology. Survivals of astrological notions appear in such practices as planting potatoes or cutting hair when the moon is waxing; the analogy being that, as the moon grows, so will the potatoes or the hair. Conversely, alders and undergrowth, and anything that one wishes to be rid of, should be cut when the moon is on the wane, so that, as the moon disappears, so will they. The pathetic incident of Barkis going out with the tide reflects a like notion of sympathy between human life and the move-ments of nature. This manner of connection or sympathy or analogy-or however we describe the slight, fanciful, remote bond—extends to many details. Religious processions must follow the direction of the sun (from east to west), and never the reverse. In stirring batter for bread, or in churning butter, the motion must be sunwise. Reversing the direction will spoil the result or invite bad luck. Such reversal is itself an apt instance of analogy as it prevails in superstitious thinking. A reversal of a normal direction becomes unholy or unlucky. Since right-handedness is the normal relation, something of the weird or prohibited attaches to the left. Sinister means, literally, left, but has the secondary meaning of suspicious or of bad omen. A reference to the left shoulder reverses the meaning, or averts the consequences of a falsehood; or, by the value attaching to the unusual, the left hind foot of a rabbit becomes a charm, or one must see the new moon over the left shoulder, and with silver in one's pocket, to insure good luck. Superstition tends to become ever more detailed and determined. Every minute practice and circumstance carries some slight measure of good or ill luck. The choice of food, of dress, the conduct of the chase, of war, of sowing and reaping, are all regulated minutely; for superstition invests trivial circumstances with significance and weaves a close web of regulation-of what to do and what not to do-that hampers action and fetters the mind. Science liberates, while superstition enslaves.

The notion of sympathy or, in another form, correspondence, is prominent in magic; it is recognized as sympathetic magic. The common form of the practice is for working ill, casting a spell, or bewitching. Some primitive people hardly attain to the notion of a natural death; death is either the obvious consequence of a violent injury, or to be accounted for as an obscure, magical influence. The sorcerer wishing the death of a victim makes a crude image of the person, or obtains a lock of his hair, the parings of his finger nails, an article of clothing, or dedicates some object to represent the victim; he then sticks thorns into the image, burns it, buries it, tortures it, pro-

nounces incantations upon it, in the belief that all these evils will happen to the enemy. In a trial for witchcraft in 1618, two women were executed at Lincoln for burying the glove of Henry Lord Rosse, so that "as that glove did rot and waste, so did the liver of said lord rot and waste." Such is sympathetic magic.



HOW TO DESTROY AN ENEMY BY PROXY

A sorceress sells an effigy of the enemy to the person who is seeking revenge. The effigy is then stuck full of pins and otherwise tormented until the person it represents dies. It is hard to believe in this enlightened age that such a superstition ever could have swayed the hearts and minds of men.

Protection by Charms. The two notions that disaster may be transferred by wishing evil, and that some persons have peculiar magical powers, unite in the belief in the "evil eye," which is widespread in the Orient and from there invaded Italy. By some peculiarity of appearance or manner, certain persons of low or high degree get the reputation of possessing the evil eye. Hence all sorts of countercharms are devised to offset the deadly glance. (It is interesting to note that we still call any trinket, such as is carried on a watch chain, a charm, but accept it merely as an ornament; yet these sometimes carry a device suggestive of the old meaning.) The charm may be in the form of a prayer written on paper, or a formula, or a metal or stone; the bits of mirror worked into Oriental embroideries carry the tradition of being such countercharms.

Any holy object or relic may be used as a charm, as by like power it may cure disease. Some are protections against definite ills, such

as shipwreck (this is true of some of the tattoo marks of sailors), or smallpox, or violent death. Others indicate a protection against the entry of evil spirits. The horseshoe nailed over the door is a familiar example. It survives as a general symbol of good luck, but carries mainly the notion of protection to a house. About it are gathered minute ceremonies. In the Spreewald (Germany), the finder of a horseshoe must at once return to his house without speaking to anyone (for speaking breaks the charm; similarly, when children wish on the first star that appears at evening, they wait to be spoken to before speaking); he must hang it over the door with the prongs up (for if hung the other way, the luck will fall out); it must be nailed with three nails and three blows of the hammer (mystic power of three, probably derived from the Trinity). (If a maiden finds a horseshoe and it has nails in it, the number of the nails indicates the number of years before she will be married; another example of the doctrine of signs.)

The origin of the horseshoe tradition is not clear. It belongs to modern rather than to the most ancient folklore. The virtue may lie in the shape, in the metal, in the association with the horse. The fact that we cannot readily determine the basis of its choice shows how far we have grown away from the type of thinking that gave it peculiar power. It is also a good example of the type of logic that is sufficient to establish a belief. There is no proof of relation between a horseshoe and good fortune. Favorable cases are noted, and unfavorable ones neglected or explained away as due to lack of proper ceremonies or the bad character

of the persons concerned. A word should be said concerning the use of names as charms, and the importance of formula in incantations. The primitive idea regards the name and the person as closely connected; true names may be concealed, lest by their use one may be bewitched. Holy names must not be spoken. The custom of "taboo" thus arises. But, as in the tales of Arabian Nights the magic word brings the genie or opens the mystic door, so in the administering of drugs or the performing of rites to bring luck, mystic words are used; without the right words, the charm fails. Words are also countercharms, and if spoken at the proper moments, ward off evil. The notion is preserved in the common superstition of touching wood to prevent the happening of trouble that is mentioned. (The wood is by some referred to the symbol of the cross.) A traveler mentions that he was never in a railway accident, or a mother mentions that her children never had whooping cough; and at once touches or knocks on wood to prevent the mere mention of the misfortune from bringing it on. The Germans, under the same circumstance, say "Unberufen," similarly to prevent the mere name or mention from bringing on the reality. The magic of names has a large history, in which remote notions of such connection are embodied (see MAGIC).

The Folklore of Salt. It is difficult to sav why one article rather than another becomes the center of folklore superstition. The folklore of salt is a typical instance. It, too, is supposed to keep off spirits; and throwing a pinch of salt over the left shoulder is a ceremony that in some countries is a means of keeping the devil at a distance. The spilling of salt as a bad omen is widely current; it is commonly interpreted as the sign of a quarrel, possibly because the acceptance of salt indicated friendly hospitality. An example of sympathetic magic with salt is the following from the South of England. A maiden on three successive Friday nights throws a pinch of salt into the fire, and says:

"It is not this salt I wish to burn,
It is my lover's heart to turn;
That he may neither rest nor happy be,
Until he comes and speaks to me."

On the third night, she expects to see her lover. Note the number *three*, and the day Friday, commonly an unlucky day, but here chosen as propitious for magic.

Superstitions cumulate, old and new notions mingle, but all in the same vein. A Swiss peasant may be advised to fortify himself against evil spirits by carrying a piece of fresh bread in one coat pocket and a psalm book in the other; a piece of rock salt in each vest pocket or inside a briarwood cane upon which three crosses have been cut. A negress may carry a rosary and a rabbit's foot in the same

pocket, for a double protection.

Driving Evil Spirits Out of the Body. practice of medicine offers a favorable field for tracing the course of superstition. The early and widespread notion that disease is caused by the invasion of a foreign spirit comes from the days when priest and physician were one. Cure takes the form of exorcism. By weird ceremonies, the shaman or priestly medicine man attempts to drive or suck or frighten the spirit out of the afflicted body. The drum and the rattle, as well as a bag of herbs or magic odds and ends, are his insignia; the drum and the rattle are now the playthings of children. This notion is part of the more general one of the direct play of spirits (animism) in the forces of nature and the conditions of life. A dream is regarded as a real experience in which the soul of the sleeper takes an excursion to another world and brings back reports. Hence the practice of never awakening a sleeper, lest his soul fail to find its way back to the body. A like belief leads to the "ghost" or returning spirit—which plays a large part in superstition, and prepares the ground for such modern move-

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ments as Spiritualism (which see)—to ancestor worship, or to the return of ancestors in the newborn child.

It may be interesting to trace some of the remote superstitious forms of such belief. Sneezing has always been regarded as an omen, in some cases as of supernatural origin. There is the feeble notion that a spirit is leaving the body in the sneeze; to turn it to good omen, the Italians say "Felicita" and the Germans "Gesundheit," thus wishing happiness and health. The spirit notion in seeking some visible expression has become attached to the image or reflection, which equally is involved in the personality. Hence the practice of covering mirrors at times of death or other occasions, of attaching a peculiarly bad omen to the breaking of a mirror; or, again, the objection of North American Indians, as of other people, to having their portraits or their photographs taken. This may be partly because the picture might be used for bewitchment, but is also because the sitter is parting with a portion of himself. The custom of naming children for ancestors is at once an intelligible sentiment and has a dim reference to an actual return; among some primitive people, the name is given according to the returned ancestor thus recognized. Oriental people will not name a child for a living relative. In such remote prejudices, we may recognize vestiges of ways of thinking that once determined the serious views of life.

Exorcism was practiced until within recent times. It was taken up by the Christian Church, and there used to cure disease and to rid haunted houses of their ghostly visitors, and against the damages caused by raids of animals, vermin, or plagues. In connection with the belief in the divine right of kings, the king's touch had peculiar power to cure scrofula. Particularly when the patient acted strangely, lost consciousness, foamed at the mouth, or raved in delirium, was the explanation of possession by a spirit resorted to. The term *epilepsy* means *seizure* and refers to the possession by a spirit (see WITCHCRAFT). The astrological notions invaded medicine and led to the belief in the moon as a cause of insanity, in deference to which notion we still use the word lunacy (from luna, the moon); and the belief prevails that sleeping in the moonlight is peculiarly dangerous. It is another phase of this belief that associated certain days with the medical practices. An ancient manuscript mentions twenty-eight days "which were revealed by the Angel Gabriel to good Joseph, which ever have been remarked to be very fortunate days, either to let blood, cure wounds, use merchandises, sow seed, build houses, or take journeys." (These good and bad days are really of Egyptian origin.) So medicines had to be taken at prescribed times and ceremonies. In such practice there is much room

for the operation of a mental attitude. The patient was impressed by the weird and minute prescriptions, and his confidence of benefit expected (see Faith Cure) was doubtless more effective in many cases than the potion or operation. It was this confusion of scientific



THE KING'S MAGIC TOUCH

The "divine right of kings" meant more than that the king could do no wrong. It ascribed to him also the peculiar power to cure his subjects of "king's evil," or scrofula, by touching the head of the sufferer with his hand.

fact and superstitious belief that Voltaire satirized when he said that incantations, together with a sufficient amount of arsenic, would doubtless kill your neighbor's sheep.

To illustrate the mixture of science and superstition, the following may be cited from a letter of an M.D., of date 1581: "On Friday and Saturday, the sign will be in the heart; Monday and Tuesday in the stomach; during which time it will be no good to take your ordinary physic." (The different parts of the body were associated with the signs of the zodiac, as may still be seen in the picture of the human body and the astrological signs in an old-fashioned almanac.) In an almanac of 1571, one may read: "No part of a man's body ought to be touched with the Chirurgicall instruments or cauterie actuall or potencial, when the Sunne or Moone or the Lord of the Ascendant is in the same signs that ruleth that part of the man's body."

Medical Superstitions. The principle of analogy is variously illustrated in medicine. On the side of cure, it appears in the doctrine of signature, by which eyebright (the flower having the appearance of an eye) is prescribed for eye trouble; walnuts (the shell like the skull, the kernel like the brain) for diseases of the brain; or in the practice of Chinese physicians to administer the tops, middles, and roots



TWO GROUPS OF OMENS

Above: Carrying a rabbit's foot, nailing a horseshoe above the door, finding a four-leaved clover, and picking up a pin are good omens in which many people yet believe. Below: A black cat crossing one's path, Friday the 13th, breaking a mirror, and spilling salt are regarded as evil omens even to-day by multitudes of people, regardless of abundant proof to the contrary.

of plants for diseases of the head, chest, and legs, respectively. The doctrine of sympathy was systematized in that country in the remarkable idea of treating not the wound but the weapon that inflicted it; as the salve was applied to the weapon, the wound would heal. The phrase "to take a hair of the dog that bit you" reflects the similar notion that, by means of the hair, one may cure the bite. Direct transfer is practiced by literally wishing or by contact, placing the diseases upon an animal or an object, and thus relieving the patient. Recent cases are reported in which children attacked by whooping cough were required to cough in the face of a live catfish, kept in a tub for that purpose. Similarly, by analogy, the fact that a loadstone will draw to it particles of iron has led to the belief that it will also

draw rheumatism out of the body. When the magnet was relatively unknown, it was accredited with mystic powers; and European peasants carried one to avert and cure disease. Yet the faith is no different from that which leads credulous people to-day to pay hand-somely for "electric" belts and similar fraudulent devices. (For the part that the magnet has played in allied practices, see Hypnotism.)

An interesting medical superstition, likewise with an ancient history, is the notion that unusual and uncanny objects will have powerful medical effects. The most nauseous concoctions were brewed as medicines. This practice is well preserved in the formula of the witches' caldron in *Macbeth*: "eye of newt, toe of frog, lizard's leg, scale of dragon, gullet of a shark, a tiger's entrails, slips of yew gathered in the eclipse of the moon," "root of hemlock, digged in the dark," "liver of blaspheming Jew," "nose of a Turk, and Tartar's lips," "finger of birth-strangled babe":

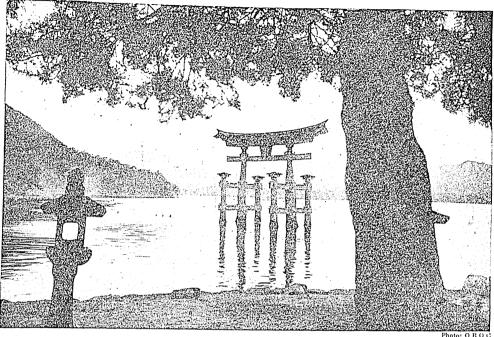
"Cool it with a baboon's blood,
Then the charm is firm and good."

Medical potions and charms (love potions or love philters particularly) were not clearly distinguished; and the drugs used, often combined with incantations or superstitious directions, were impressive because of the mystic setting in which they were prescribed.

Present-Day Superstitious Thought and ractice. The wide range of superstitious Practice. thought and practice may be further illustrated by a survey of current practices, sometimes followed with full belief in their virtue, more commonly in a playful half-belief not unmixed with a feeling that it is, on the whole, safer to conform. From 875 persons' (eighty per cent women, twenty per cent men), of ages sixteen to twenty-eight (students in two normal schools of California), there were obtained about 1,100 admissions of full belief in some superstition, about twice as many admissions of half-belief, and nearly four times as many disbeliefs. There were nearly as many who believed as who disbelieved in some form of luck, superstition, or sign.

Spilling salt is the sign of a quarrel; bubbles in the tea cup or an itching skin means visitors; a blister on the tongue means that you have told a lie; when four persons in shaking hands cross hands, it means a wedding; when your ears burn, someone is speaking of you; when you have the cold shivers, some one is walking on the spot that will be your grave; stepping on the cracks of paving stones means that you will fail in your lessons; giving a knife cuts friendship; breaking a mirror, walking under a ladder, postponing a wedding, opening an umbrella indoors, turning back on a journey, stubbing the toe, wearing clothes inside out, wearing a peacock feather, meeting a funeral,

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SUPERSTITION CONNECTED WITH THE TORII GATE

Such a fantastic structure is usually placed before the entrance to some sacred place and also is seen in harbors and waterways. It is a belief of Japanese sailors that fair weather and success will attend them on a voyage if their craft is sailed beneath the lintels of the torii. Only very small boats can actually pass through the gate.

going out of a house through a window, sitting on a table, are all signs of bad luck; finding four-leaved clovers or horseshoes, picking up pins, returning part of money in payment, are signs of good luck. Add to these the avoidance of Friday for enterprises, the refusal to sit down if there are thirteen at table, the belief in dreams, and one has a fair notion of the great body of traditional folklore which has come down the ages and obtains more or less of a hold upon the growing minds of even the educated classes; incidentally, the attempt to see some kind of meaning or connection between sign and event requires an initiation into the byways of outgrown systems and the ways of primitive thinking.

As now current, these are fairly innocent superstitions, which interfere but slightly with the regulation of conduct by scientific thinking. That even slight belief affects conduct is shown by the fact that rooms in hotels, cabins in steamships, and houses on streets skip number thirteen or substitute twelve and one-half; that, until recently, steamers did not set sail on Friday; that some business men avoid transactions when the thirteenth of the month falls on a Friday; or even that a Thirteen Club exists in New York, formed of thirteen members, meeting for dinner on the thirteenth of the month at 7:13 o'clock, in order to defy this superstition.

Pseudo-Science—Mixture of Fact and Superstition. The effect of the belief or entertainment is quite different when transferred to the systems of interpretation of the pseudo-scientific type. These, too, show the mixed origin and reflect the history of superstition. Most flagrant is the practice of fortune-telling. It rests primarily upon the doctrine (or the pretense) of special powers, obtained by peculiarities of birth (the seventh son of a seventh son, born with a caul), or of association with a favored tribe (the gypsies), or occult learning (India), or of actual success in prediction, or possession of a system. Fortune-telling by cards (see DIVINATION) shows how readily chance combinations may be fitted to the ordinary run of human fate. But palmistry is the most typical, in that it reads personal fortune from personal features, not as physiognomy attempted to do, by observing what kinds of qualities are associated with features, but superstitiously, by attaching far-fetched consequences to minute variations in the creases of the palm. Physiognomy, like phrenology, is a pseudo-science, because its data are utterly inadequate, unreliable, and misinterpret the relations which they observe.

These attempt to build up knowledge after the manner of a science, but really depend upon prepossession, loose reasoning, and a hopeless kind of evidence. They are superstitious only



in that the underlying idea continues the search for signs of qualities of personal value in outer indications. Psychology as a science has shown how differently one must proceed to obtain such insight, and that any rough-and-ready diagnosis or reading of character, much less of fate or fortune, is essentially unscientific, as is the search for the elixir of life, the philosopher's stone, or the fountain of youth. case of palmistry is much worse; it is plainly superstitious in spirit, in method, and in the kind of interpretation which it employs. The creases of the hand are adapted to use, and presumably had their origin in the apelike ancestors of the human race who dwelt in trees. To call one of the major creases "the line of life," and predict longevity or an early death from its variable length, is an utterly arbitrary procedure. The actual belief in such significance is quite on a par with the practice of savage tribes that put to death babes which their fortune-tellers decided were born at an evil And yet so strong are these superstitious tendencies that fortune-tellers and palmists practice a suspicious if not entirely fraudulent trade in all the large American cities, and business men, as well as men and women of all classes, consult them on financial ventures, love affairs, and the critical enterprises of life.

Nothing could more pointedly illustrate the danger that lurks in a yielding to the super-stitious habit, or permitting it to extend beyond the playful realm, where, as is true of myth and fairy tales and legends, it adds an innocent spice to adventures of human inter-Education insists that the mind's habits shall be formed by a scientific training, without stunting the imagination or neglecting the poetic and religious interpretation of life; for in all this there is illumination and progress. But superstition is stagnant and unprogressive; it is about the same in savage conditions, in the days of medieval darkness, and among the ignorant of all stages of civilization. Superstition survives somewhat naturally in those whose careers, like those of sailors, are constantly at the mercy of uncertain ventures; it may be for a like reason that gamblers, speculators, and others following venturesome forms of pursuits have a strong belief in luck and signs. Yet the more widespread tendency responsible for credulity is the inability to grasp the all-comprehensiveness of scientific thinking, and to cling to the suspicion that, outside this established realm of cause and effect, there is another type of influence, of an occult or hidden order, which now and again with a personal motive directs human fate. Inconsistent as it may be, the two tendencies manage to persist in a mind that in most affairs reacts scientifically, but keeps certain reserved areas for the exercise of the older type of beliefs. Such lapses or partial developments maintain superstitions

and the attempted revival, from time to time, of pseudo-scientific systems that are entirely out of keeping with the spirit and the life of the twentieth century and the educational ideal of a democracy.

J.J.

Relating to Various Beliefs. The following articles in these volumes, while not all bearing on superstition, are of interest in this connection:

Alchemy
Astrology
Clairvoyance
Conjuring
Demonology
Divination
Ectoplasm
Faith Cure
Hypnotism
Magic
Medium
Mesmerism
Mind Reading

Necromancy
Occult
Palmistry
Phenology
Physiognomy
Psychical Research
Psychoanalysis
Spiritualism
Subconscious
Suggestion
Telepathy
Witchcraft

SUPERVISED STUDY. Down to a century or so ago, there was no class recitation in schools; pupils recited individually to the teacher at his desk. Each pupil prepared his lesson alone, reporting to the teacher when he thought he had mastered the task assigned him; and the teacher simply listened to him, in order to determine whether he had memorized his lesson accurately. But, as education became more popular, in the sense that a larger proportion of children went to school, it was found economical to group those of the same age or similar intellectual advancement into a "grade," so that they could work and recite as a group, or class. This plan of conducting schools has been followed more or less rigidly for a century or more. But during the last few decades there has been developing a conviction that the graded plan has serious faults, principally because it tends to obliterate individuality. Much has been heard of the "lock step in education." This phrase has been used to condemn the practice of treating all children of the same age as though they possessed the same measure of intellectual power. It has been said very freely that this graded system has made it impossible for wellendowed pupils to push forward in their development as rapidly as their talents would warrant, while, at the same time, it has tended to overtax the inferior pupils.

When thirty or forty pupils are taught in the same group or class, it is difficult, and most teachers have thought it was impossible, to give much if any attention to individual pupils. If a pupil was too slow to keep up with the group, he was likely to encounter insurmountable obstacles when he began to fall behind the class. His teacher would not spend time with him, to help him to surmount his obstacles, and so he would be likely to go from bad to worse. Further, a teacher having a large group under her care could not give any assistance to an exceptionally bright pupil, in

order to enable him to "skip" a grade. Whenever the graded plan has been followed rigorously, it has been practically impossible for any pupil to progress more rapidly than his grade.

In a grade of from forty to fifty pupils, whenever a pupil needs special help, his teacher is compelled to tell him that he must secure it outside of school, and this means that his parents must help him, so that home study is required of all pupils who find it difficult to keep up with their class. Even the brighter pupils are required to master some of their tasks at home. Serious complaint has been lodged against this requirement, by parents who have maintained that their children should receive all the assistance they need in the school, and that the home should not be converted into a schoolroom. There has been a growing conviction, too, that, when a pupil leaves the school, he should leave school tasks behind him, so that he may have time for relaxation and for participation in home activities.

Remedying the Defects of the Graded System. In order to meet the criticisms that have been directed against the graded system, various plans have been suggested, with a view to providing for the needs of individual pupils and supervising the preparation of their lessons, so that they could utilize their time in the school to the greatest advantage. It has been shown that without direction most pupils acquire wasteful habits of study. This is particularly true when they do much of their work at home. Investigations have revealed the fact that the majority of parents do not understand how to assist their children so that they can gain initiative, resourcefulness, and independence in the performance of intellectual tasks. There has been continually increasing complaint on the part of teachers respecting the bad mental habits which pupils acquire in the study of their lessons at home, so that there is to-day widespread belief that it would be better if pupils would receive little or no help in their school work from their

But if a pupil is not likely to adopt the most economical and effective methods of study on his own initiative, and if his parents cannot help him to acquire these methods, then it follows that the teacher must direct the pupil's study, for the purpose of preventing him from contracting wasteful and ineffective habits. Different plans have been proposed and tested, in order to meet these requirements. In Pueblo, Colo., all class recitation and home study in the schools of the city were abolished, and "supervised study" was substituted. Following this plan, a teacher dealt with each pupil individually, and he was permitted to go forward in any subject as rapidly

as his native ability and his power of concentration would enable him to do. This was known as the Pueblo Plan.

Following this experiment, Batavia, N. Y., adopted the plan of having periods of supervised study or directed study, to supplement class instruction. All pupils were required to prepare their lessons during these prescribed periods, and teachers supervised their method of work. This is known as the Batavia Plan. It has been applied in different forms in various cities throughout the country. In some places, the teachers in charge of an assembly or study room in a high school supervise the work of the pupils while they are preparing their lessons. In other cities, pupils who are deficient or delinquent in any study are required to attend make-up study classes, in which their work is supervised by the teachers in charge. In still other cities, pupils are permitted, on their own initiative, to attend supervised study classes if they wish to receive assistance. According to this plan, no pupil is required to attend a supervised study class, but any pupil may be permitted to do so. Finally, the principle of the Batavia Plan is applied in some of the schools of the country in the establishment of a double-class period, a part of which is devoted to recitation, and the rest of it to preparation of advanced work under the supervision of the teacher.

SUPINATORS, su pih na' torz. See ARM. SUPPLY AND DEMAND. In economics, supply refers to the quantity of goods that will be offered for sale, in a given market, at various prices; and demand refers to the quantity of goods that will be purchased at various prices. The relation between the supply and demand determines the price of the commodity. If the supply is great, as compared with the demand, the price will be low; and if the supply is small, as compared with the demand, the price will be high. For a more detailed discussion of this principle, see Value (Supply and Demand); Economics.

SUPRARENAL, su prah re' nal, CAPSULES. See Adrenalin.

SUPRARENALS. See GLANDS (Ductless Glands).

SUPREMACY, ROYAL, an English legal term used to denote the power of the king over the Established Church. Until the period of the Reformation in England, the Pope had been the acknowledged head in ecclesiastical matters. In 1534, after the Pope had refused to annul the marriage of Henry VIII and Catharine of Aragon, and to declare the marriage with Anne Boleyn valid, Henry induced Parliament to declare him head of the English Church. Twenty years later, Mary had this act repealed, but in the reign of Elizabeth, Parliament passed a new Act of Supremacy. To-day, the theory of royal supremacy is rec-

ognized, but the king exercises no control over spiritual matters. See Church of England.

SUPREME COURT OF THE UNITED STATES. The highest judicial court of the Federal government of the United States, and one of the most remarkable tribunals in the history of jurisprudence. It is established by virtue of the Constitution (Article III, Section 1), which reads:

The judicial power of the United States, shall be vested in one Supreme Court, and in such inferior courts as the Congress may from time to time ordain and establish.

The Constitution does not prescribe the organization of the court nor specify the number of judges on its bench. By implication, the determination of these details is delegated to Congress. In 1789 Congress passed the first Judiciary Act providing that the Supreme Court should consist of a Chief Justice and five Associate Justices, and should hold sessions at the seat of government. In 1837, the number of justices was increased to nine, and in 1863 to ten. In 1866, with deliberate intent to prevent appointments by President Johnson, Congress reduced the bench to seven. Three years later, the Court was fixed at nine, which is the present number. The Chief Justice receives a salary of \$20,500, and the Associate Justices \$20,000. A justice who has reached the age of seventy and who has served ten years is entitled to retire on a pension equal to his salary. Concerning appointment and tenure of justices, see Courts.

Sessions of the Court. Each of the nine justices is assigned to one or two of the ten judicial circuits into which the country is divided. In early years, the justices used to travel "on circuit," hearing cases at various places; this is no longer done. Sessions of the Supreme Court are held annually from October to May in the stately palace of the Court in Washington. Cases are argued before the Court by attorneys who present the contention of their clients, the parties to the controversies. Six justices are required to be present at the argument of a case (usually every justice attends), while a decision can be reached only by the concurrence of a majority. If the Court is evenly divided, a rehearing of the case is ordered. After an argument, the justices discuss the issues of the case in secret session in the conference room. The vote on the decision is taken by the call of the Chief Justice who asks the opinion of his colleagues, beginning always with the most newly appointed member. The Chief Justice then assigns one of the justices to prepare the opinion, namely a formal statement of the reasons whereby the Court reached its decision. Any other justice may, if he desires, write a concurring opinion, or, if he holds contrary to the decision, he may

write a dissenting opinion. The opinion in every case, together with any concurring or dissenting opinions, is read in a public session of the Court, and is published in the United States Reports.

Turisdiction of the Supreme Court. Court's jurisdiction or authority extends to the awarding of decisions in cases or controversies as defined in the Constitution. Cases come before the Supreme Court in two ways. A few may be commenced in this high tribunal, and in these cases the Court has original juris-According to the Constitution, the original jurisdiction of the Supreme Court is limited to cases affecting ambassadors, ministers, and consuls; and those in which a state is a party. In all other cases, the Court has appellate jurisdiction. In other words, the majority of the cases heard by the Court come on appeal from the lower Federal courts or from the highest courts in the several states. Appeals from state courts can be taken only when a Federal question is involved.

Judicial Review. What gives unique distinction to the Supreme Court is its authority to render final decision upon questions of the constitutionality of acts of Congress. In this capacity, the Court acts as the guardian of the Constitution, upholding the supremacy of the national laws and preserving the rights of the states. The authority to examine the validity of acts of Congress is not specifically granted in the Constitution. In 1803, in the case of Marbury v. Madison, the Court asserted this right and has never ceased to exercise it. Briefly stated, the power of the Court to review acts of Congress rests on the following theory:

following theory:

The courts are established by the Constitution in order to find the law.

The Constitution is the supreme law of the land, and statutes, whether acts of the national or of the

state legislatures, are inferior to it.

Accordingly, where the courts find any clause in a statute to be in conflict with the Constitution they are compelled to pronounce such statute null and void. Judicial review involves interpretation of the Constitution, and thus Chief Justice Hughes was literally correct when he said: "We are under a Constitution but the Constitution is what the judges say it is."

Political controversies have arisen over judicial review, and, in particular, four-to-five decisions have been criticized. One of these controversies followed the decisions of the Court which invalidated several of the acts of Congress which composed President Franklin D. Roosevelt's New Deal. Various proposals for restricting judicial review have been offered, such as the requirement of a six-to-three decision for the invalidation of acts of Congress, or the denial of the power to review an act which once having been invalidated by the Court is again enacted by Congress.

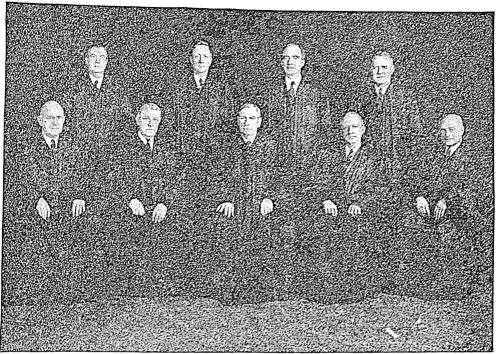


Photo: Harris & Ewing

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SUPREME COURT OF THE UNITED STATES

Left to right, seated are Associate Justices Reed and Roberts, Chief Justice Stone, Associate Justices Black and Frankfurter; standing are Associate Justices Jackson, Douglas, Murphy, and Rutledge.

Members of the Supreme Court

Black, Hugo L. (1886), appointed in August, 1937. He was born in Harlan, Ala., and entered law practice in Birmingham in 1907. He had served two years as a prosecuting attorney and eleven years in the United States Senate prior to his appointment.

Douglas, William O. (1898), appointed in March, 1939, became the youngest member in over 100 years. Born in Minnesota and reared in the state of Washington, he was admitted to the New York bar in 1926. Thereafter he taught law, first at Columbia and later at Yale, and became chairman of the Securities and Exchange Commission in 1937.

Frankfurter, Felix (1882), appointed in January, 1939. He was born in Vienna, came to America in 1894, and after 1914 held a professorship at Harvard Law School. He refused two other appointments—to the Massachusetts Supreme Court in 1932 and as United States Attorney General in 1933.

Jackson, Robert H. (1892), appointed in June, 1941. He was born at Spring Creek, Pa., and admitted to the New York bar in 1913. In Washington after 1934, he made a brilliant record as general counsel to the Bureau of Internal Revenue; later, as Solicitor General, then Attorney General.

Murphy, Frank (1893), appointed in January, 1940, following a year as United States Attorney General. Previously, he had served as Governor General and then High Commissioner of the Philippines (1930-1933), and Governor of Michigan, his native state (1936-1938)

Reed, Stanley F. (1884), appointed in January, 1938. He was born in Kentucky and entered legal practice in 1910. He became attorney for the Federal Farm Board in 1929, and in turn, counsel for the RFC, special assistant to the attorney general, and in 1935 Solicitor General.

Roberts, Owen J. (1875), appointed in 1930. His birthplace was Philadelphia, where he still lives. During World War I, he aided in the prosecution of cases tried in Pennsylvania under the Espionage Act. In 1924, he was one of the Federal attorneys in the investigation of the Teapot Dome scandal.

Rutledge, Wiley B. (1894), appointed in January, 1943. He was born in Cloverport, Ky., and admitted to the bar in 1922. A law school dean and legal scholar, he served as Associate Justice of the United States Court of Appeals, District of Columbia, after 1939.

Stone, Harlan F. See biography.

The Chief Justice. Eleven men have presided as Chief Justice. The outstanding jurist among this number is John Marshall, who served from 1801 to his death in 1835. logical opinions established precedents which have guided the Court for years. Above all, he set the standard for a liberal construction of the Constitution. For these reasons he has been called "the second Father of the Constitution." William Howard Taft (1921-1930) is the only ex-President who has served as chief justice. Following is a complete list:

John Jay, of New York. Appointed in 1789 by President Washington, resigning in 1795, to become governor of New York.

John Rutledge, of South Carolina. Appointed in 1795 by President Washington. He presided over one term of the court, but the Senate refused to confirm his appointment in December of that year.

Oliver Ellsworth, of Connecticut. Appointed in 1796 by President Washington. He resigned in 1799. John Marshall, of Virginia. Appointed in 1801 by President Adams, and served until 1835. William Cushing of Massachusetts was appointed, but declined the honor.

Roger B. Taney, of Maryland. Appointed in 1836 by President Jackson. He served until his death, in

Salmon P. Chase, of Ohio. Appointed in 1864 by President Lincoln. He served until his death, in

Morrison R. Waite, of Ohio. Appointed in 1874 by President Grant. He died in 1888.

Melville W. Fuller, of Illinois. Appointed in 1888 by President Cleveland. He died in 1910.

Edward D. White, of Louisiana, then an Associate Justice, was appointed in December, 1910, by President Taft. He died in 1921.

William Howard Taft, former President. Appointed in 1921 by President Harding. He resigned

February 3, 1930, and died March 8 of that year.

Charles Evans Hughes, former Associate Justice.

Appointed in 1930 by President Hoover, Hughes retired in 1941

Harlan Fiske Stone, former Associate Justice. Appointed in 1941 by President Roosevelt. See Courts; Constitution of The United STATES; and biographies of chief justices.

SURAJAH DOWLAH, soo rah' jah dou' lah. See BLACK HOLE OF CALCUTTA.

SURAT, soo rat'. See India (The Cities). SURFACE MEASURE, TABLE OF. See DENOMINATE NUMBERS.

SURGEON BIRD. See JACANA.

SURGERY, as well as other departments of healing, has made remarkable progress since the beginning of the nineteenth century. Both medicine and surgery owe a debt, one that cannot be estimated, to three great discoveries of that century: anesthesia; the germ origin of putrefaction and disease; and that reliable friend of diagnosis—the X-ray. In the days before anesthetics were used, surgical operations entailed such agony that the surgeon was dominated by one idea, and that was to conclude his work as quickly as possible.

To-day, he is able to perform delicate and intricate operations on the brain and abdominal organs, because he can work on a relaxed and unconscious patient who can be kept under anesthesia as long as may be necessary. The first anesthetics to be used in professional practice were nitrous oxide, or laughing gas, ether, and chloroform, all of which were introduced between 1840 and 1850. Ethylene for general anesthesia, harmless derivatives of cocaine for local use, and the drugs of twilight sleep for childbirth, are some of the newer drugs now being employed. The administration of nitrous oxide has been greatly improved by the invention of apparatus for mixing it with oxygen. Some of the other modern developments in anesthesia include nerve blocking, intraspinal anesthesia, and the administration of narcotics to quiet the patient's nerves before the anesthetic is administered (see An-ESTHETIC).

The great biological chemist Louis Pasteur laid the foundation for antiseptic surgery when his long-continued research revealed conclusively that certain one-celled organisms are the cause of infectious diseases, and that putrefaction is the result of bacterial activity. Joseph Lister, an English surgeon, applied Pasteur's discovery to his work, and about 1865 began a technique in the operating room that was to revolutionize surgical practice.

Lister developed a method of destroying the germs that were causing so many of his patients to die of blood poisoning, after successfully withstanding severe operations. The modern technique is a refinement of "Listerism," with the emphasis placed on keeping out infection by means of scrupulous cleanliness, entailing the use of antiseptics previous to the operation. In the article Antiseptic, the reader will find a detailed description of

modern aseptic surgery, as it is termed.

The relation of the X-ray to diagnosis is of fundamental importance. This great ally of the physician and surgeon alike was discovered in 1895 by Wilhelm Roentgen. By means of X-ray apparatus, shadow pictures are taken that reveal bone fractures, hidden objects such as bullets, lung tuberculosis, tumors and cancers, abscesses, gallstones, and many other abnormal conditions. The information thus revealed enables the surgeon to avoid unnecessary operations, gives him a definite idea of the location and nature of the ailment, and permits a refinement of diagnosis undreamed of in the era preceding Roentgen's discovery. The X-ray also has curative effects, and may sometimes be a substitute for operation, as in treatment of malignant growths in the early stages. Radium, whose discovery was a later development of experimentation in the field of radiation, is likewise an agent of healing that in some cases makes operation unnecessary. Thus modern surgery has not only perfected the art of healing with the knife, but has found ways of avoiding use of the knife.

The scope of surgery as practiced to day is

too wide to permit a complete listing of its achievements, but the following is typical of what is being done in modern hospitals. Some of the most remarkable cures have been effected in the treatment of abdominal diseases. It is not considered an unusual operation, for instance, to remove the affected part of a diseased intestine, even several feet of it, and to sew the severed ends together. Sometimes two openings are made in the intestine, one above the diseased part and one below. Then the two openings, placed opposite each other, are united, and the contents of the organ follow the new route. An enlarged spleen, a diseased gall bladder, or a diseased kidney may be re-

moved, and the patient make a complete recovery. Diseased kidneys are also opened and drained and freed of abscesses, and a floating kidney is sewed fast to the proper place of attachment.

Great advance has also been made in the treatment of brain diseases. Tumors and abscesses in this organ can be successfully removed, cut arteries can be secured, gunshot wounds cured, and pressure on the brain corrected. Certain forms of epilepsy caused by disease of the brain have been cured by operation. Other triumphs of surgery are the correction of squint (crossed eyes), grafting of healthy skin on raw wounds or burns, transfusion of blood, straightening of crooked legs, and transplantations of healthy organs, pieces of bone, and tissues, to take the place of diseased parts. The knife is still the most

important means of cure for cancer, and surgery is successfully applied in numerous cases of goiter and other thyroid disturbances. W.A.E.



HOW THE GEOLOGICAL SURVEY WORKS

Its members climb high mountains, descend into lowest places, search the wilds, penetrate almost inaccessible spots, and find no task too severe to enable them to make correct computations of America's physical features. The man in the illustration is on the summit of Post Peak, in the Yosemite Valley of California.

Related Subjects. The subject of surgery is closely connected with the following topics in these volumes. Since a number of these have extensive indexes, the range of reading indicated is a wide one.

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Amputation
Anatomy (with list)
Anesthetic
Antiseptic
Bacteria and
Bacteriology
Bandage
Disease (with list)
Disinfectants
Fracture
Granulation
Hospital
Medicine and Drugs
(with list)
Radium
Roentgen Rays
Tourniquet
Vivisection

SURINAM, soo rih nahm', the official name of Netherlands Guiana. See Dutch Guiana.

SURREY, EARL OF. See BLANK VERSE: SONNET.

Verse; Sonnet. SURTAX. See Income Tax.

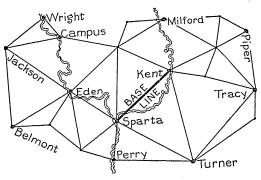
SURVEYING, sur va' ing, the art of ascertaining the shape and area of any portion of the earth's surface, or of running lines

of running lines and determining angles to fix boundaries. Land surveying, with which most people are familiar, is for the purpose of fixing boundaries and determining areas of comparatively small plots of ground. In the United States and Canada, the boundaries and divisions of public lands have been fixed by government surveyors. The land surveyor is replacing his compass with the familiar theodolite, and his chain with invar tape for measuring distances, in running his lines. The accompanying diagram deals with land surveying.

Surveying for fixing boundaries is often called plane surveying. Topographical surveying is conducted on a much larger scale, and includes the measuring of altitudes and the mapping of elevations and depressions within the region. Topographical surveying is used

in making surveys for maps, and is usually under the direction of the national government.

The art of surveying is as old as civilization; it originated in Egypt, where the inundations of the Nile annually obliterated boundaries.



HOW AN AREA IS SURVEYED

Starting with a base line, as between Sparta and Kent, in the drawing, other lines are laid, completing a triangle. With one of the new lines as a base line, another triangle is laid out. This process is continued until all the objectives have been gained.

Based on the science of geometry, surveying requires a thorough knowledge of mathematics, and the ability to use delicate instruments

with a high degree of accuracy.

World War I brought about several new scientific inventions; nautical surveying developed new aids to navigation; and an entirely new branch of the science came into existence in aerial survey, which measures distances on the ground by means of aerial photography.

Related Subjects. The reader is referred to the following articles in these volumes:

Coast and Geodetic Survey Compass Engineering Lands, Public

SURVEY OF PUBLIC LANDS. See LANDS, PUBLIC (Ranges, Townships, and Sections).

SURVEYOR'S COMPASS. See Compass. SURVIVAL OF THE FITTEST. See Evolution; Natural Selection.

SUSA, su' sah. See Persia (The Cities). SUSPENSION BRIDGE. See Bridge, subhead.

SUSQUEHANNA RIVER, a waterway through one of the most important industrial regions in Eastern United States. It is formed by the union of two small branches whose sources are, respectively, Schuyler and Otsego lakes, in Central New York. The main stream flows in a general southwesterly direction to the Pennsylvania line, traverses that state in an irregular course southward, and then flows for a short distance through Maryland, entering Chesapeake Bay at Havre de Grace. Its total length is about 500 miles, and its chief tributaries are the Chemung, the West Branch, and the Juniata. It is of little value

as a commercial route, because of its swift current and shallowness.

Harrisburg, the capital of Pennsylvania, is an important industrial city on its banks.

SUTLEJ RIVER, the most southerly of the five waterways of the Punjab, in India, and the largest tributary of the Indus (which see). Rising in the lofty plateau of Tibet, nearly three miles above the sea, the Sutlej winds its way through the passes of the Himalayas, traverses the hill states of Simla, and then flows in a southwesterly direction through the Punjab, joining the Indus near Mithankot. Its length is about 950 miles. Below its junction with the Chenab, the most important tributary, it is called the Panjnad, or Five Rivers. The Sutlej is of little importance as a navigable waterway, except for inland craft, but its waters are used in irrigating the arid plains of the Punjab.

SUTRO TUNNEL, a tunnel which Adolph Sutro constructed in 1869-1878 to drain hot water from the lower levels of the Comstock Lode and carry gold and silver ore to mills.

SUTTEE, suh te', means a good wife. It is also the name for a rite which was practiced sometimes in India, when a wife to show her devotion to her husband, voluntarily mounted his funeral pyre and let herself be burned with his body. The custom was, perhaps, borrowed from the Scythians, or other barbarians to the north, and was mentioned by the Greeks about the time of Alexander the Great. It is not found in the teachings of the Vedas, the early sacred book of India, and is nowhere mentioned in the Laws of Manu, a later book which guided Hindu life. An ancient book of rules for living in India recommended that the wife lie down beside her husband's body on the funeral pyre, for a few moments. Then she was commanded, "Rise up, O woman, come back to the world of life."

In later days, by a strange distortion of the characteristic of self-sacrifice, some women, expecially the wives of kings, remained on the funeral pyre until they were burned to death. The English Government in 1829 ordered this practice abolished. This was easily accomplished, for the Government decree met with no opposition from the people. It was found from official records that there were few women in all India who practiced this barbaric custom. See India (Social Customs).

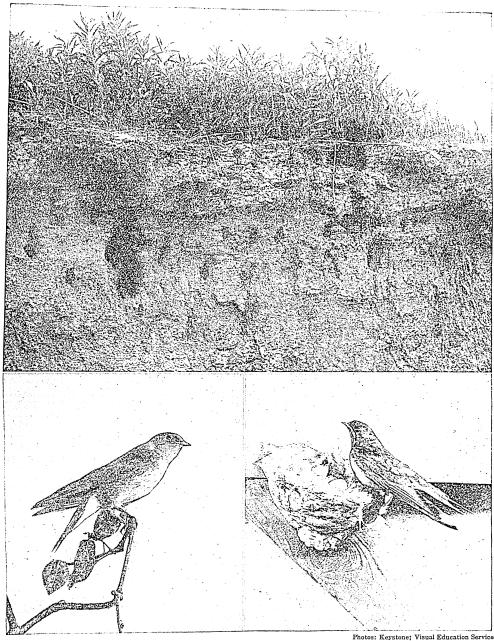
SUTTER, JOHN A. (1803-1880), an early settler on whose land gold was discovered in 1848. See California (Discovery of gold).

SUTTER'S FORT. See CALIFORNIA (Other

Places to Visit).

SUWANEE RIVER, a stream that winds through North-Central Florida for about 240 miles, and empties into the Gulf of Mexico. The river rises in the swamps of Southern Georgia, meanders past small villages, and

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The swallow is come!
The swallow is come!
O, fair are the seasons, and light

Are the days that she brings,
With her dusky wings,
And her bosom snowy white!
—LONGFELLOW: Hyperion.

Bank swallows, smallest members of the family, live in colonies in nests which they have dug in the precipitous sides of sand hills; sometimes a colony will contain more than a hundred nests. Below, at left, a bank swallow; at right, a barn swallow. (See Swallow, page 6946.)

carries no traffic except wide-bottomed rowboats. Yet it is as famous as the Hudson, for Stephen Foster (which see) began that haunting and simple song, *Old Folks at Home*, with the words:

Way down upon the Suwanee River, Far, far away,
Dere's wha my heart am turning ever,
Dere's wha de old folks stay.

SUZERAIN. See FEUDAL SYSTEM.

SVALBARD, a Norwegian territory of which Spitsbergen is a part. See Spitsbergen. SWAHILI, swah he' le, a branch of the Bantu

tribe in Africa. See Bantu.

SWALLOW, a small, graceful bird, with long, powerful wings, small, weak feet fitted only for perching, and a large mouth adapted to the capture of insects, upon which it feeds almost exclusively. It devours countless num-

bers of mosquitoes.

Swallows are found in all parts of the world. Most of them are migratory, flying great distances to avoid cold or to find a food supply. So far as known, they migrate by day, flying together in large numbers and spending the nights in woods or marshes. They nest both in pairs and in colonies. Some make their homes in holes in banks or trees, and others build rough, stuccoed nests of clay or mud, which they place on beams of bridges or on rafters in barns. Several species have modified their nesting habits through their contact with man. The three to nine eggs are pure white or white spotted with brown. Swallows twitter rather

Among the swallows of North America are the barn swallow, with steel-blue back, chestnut-colored breast, and deeply forked tail, perhaps the swiftest in flight of all birds, traveling 10,000 miles in yearly migration; the *cliff swal*low, distinguished from the barn swallow by its square tail; the tree swallow, which often nests in bird houses; the bank swallow, or sand martin, the smallest of the family; and the purple martin (see Martin). See, also, page 6945.

Scientific Names. The swallows belong to the family Hirundinidae. The barn swallow is Hirundo erythrogastra; the cliff, Petrochelidon lunifrons; the tree, Tachycineta bicolor; the bank, Clivicola riparia.

SWAMP FOX, a nickname applied to Francis Marion (which see).

SWAMP HICKORY. See BITTERNUT. SWAMP ROSE MALLOW. See Hibiscus.

SWAN, a stately water bird, belonging to the same family as the geese and ducks. The beauty of its snowy plumage and the proud poise of its long, graceful neck have ever suggested, to the song-writer and the poet, a majestic white ship sailing over the waters. It is a poetic fancy of unknown origin that the swan chants its own death dirge, whence the "swan song" famed in legend and in verse. This tradition has no scientific basis, but it has been the inspiration of many charming poetic lines, such as are found in the Evening Songs of the German poet Heine. [See the verse under the accompanying illustration.]

There are about eight species of the swan group, found in various parts of the world. They have the common habit of migrating in V-shaped flocks, and of uttering loud, trumpet-

like notes, when on wing. They subsist on one seeds and roots of water plants, and on worms and mollusks, dipping the long, curving neck far into the water as they probe the bottom.

The American, or whistling, swan nests in the vicinity of the Arctic Ocean and the Hudson Bay region, migrating in winter as far south as the Gulf of Mexico. Formerly, when these birds were more abundant than now, between October and April large flocks of the whistling swans wended their way southward, flying, it is said, at the rate of 100 miles an hour, and filling the air with sounds ranging from deepbass notes to the shrillest tones of a clarinet. The nest, lined with down from the bird's own body, is made of sticks and water plants, and is sometimes two feet high and six feet across. Two to six eggs, grayish in color, are laid in June. The young, called cygnets, are at first covered with grayish-brown down, which becomes snow white by the end of a year. Their unattractive appearance is the basis of the fable The Ugly Duckling (see Story-Telling). A male swan is called a *cob* and the female

The whistling swan is a little less than five feet long, and is white except for a yellow spot between nostrils and eyes. The legs, feet, and bill are black. Similar to the whistling swan is the *trumpeter*, an American bird now rarely seen. It is larger than its whistling cousin, and has a call resembling the tones of a French clarion. Except for the presence of the yellow spot on the head of the whistler, these

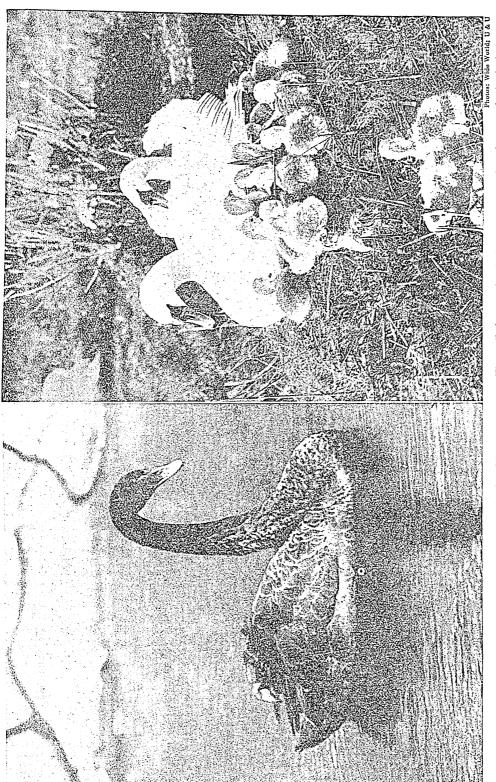
swans are alike in plumage.

In the eastern hemisphere are found the European whistling swan, Bewick's swan, a smaller bird, and the mute swan, the majestic species commonly seen in zoölogical gardens, parks, and estates. It is said that it never uses its voice in captivity. A beautiful species known as the black swan, which has a scarlet bill banded with white, is native to Australia. South America has the black-necked swan. D.L.

Scientific Names. Swans constitute the subfamily Cygninae of the family Anatidae. American naturalists place most of the species in the genus Olor, while the English synonym for this term is Cygnus. The whistling swan is Olor columbianus. The Australian swan is Chenopis atrata.

SWAN, JOHN MACALLAN (1847-1910), an English painter and sculptor, noted for his studies of animals. Among his sculptures are The Jaguar, Puma and Macaw, Wounded Leopard, and Leopard Running. His paintings include Ocelot and Fish, Tigers, Tigers Drinking, Ceylon Leopards, and Panthers Resting. He also painted landscapes and human figures. Swan was born at Old Brentford, and studied in London and Paris. In 1905 he was elected to the Royal Academy.

SWANSON, GLORIA. See Moving Pic-



And over the pond are sailing Two swans all white as snow;

Sweet voices mysteriously wailing Pierce through me as onward they go.

They sail along, and a ringing Sweet melody rises on high;

And when the swans begin singing They presently must die.—Heine: Evening Songs.

THE STATE OF THE S

tional school at Swarthmore, Pa.

SWASTIKA, swahs' tih kah, an ancient sign or symbol, now an emblem of good luck. It has been found in Byzantine architecture; and as an ornament and a religious symbol, it was used by the North American Indians. It also has been noted on Buddhist inscriptions, Celtic monuments, and Greek coins. It is shaped like a right-angled cross, with short upright extensions forming right angles on the long lines. It is the emblem of the National Socialist Party of Germany. See illustration of swastika banners, page 2777.

SWAYNE, CHARLES, a judge of the United

States District Court. See IMPEACHMENT. SWAZILAND, swah' zih land, a British protectorate located at the southeastern corner of the Transvaal, South Africa. Politically, it is not a part of the Union of South Africa, as authority over Swaziland was transferred from the governor of the Transvaal to the British High Commissioner for South Africa, in 1906. The protectorate has an area of 6,705 square miles. The population, at the 1936 census, was 156,715, including 2,740 Europeans. There are four European villages. Mbabane, at an altitude of 3,800 feet, is the seat of government. The principal agricultural products are cotton, corn, millet, tobacco, groundnuts, and such fruits as pears, peaches, and apricots. Tin and gold are mined. See PROTECTORATE; AFRICA (Division into Countries)

SWEATING SICKNESS, a fatal disease first known in 1485 in England, and so called because it was characterized by profuse sweating. Successive epidemics appeared at intervals until 1551; and an outburst occurring in 1528 swept over Europe, causing thousands of deaths. An attack began suddenly with cold shivers, dizziness, headache, severe bodily pains, and prostration. The characteristic sweating followed the cold stage, and was accompanied by a sense of heat, delirium, intense thirst, and rapid pulse. The disease was sometimes fatal in a few hours. A modern form of sweating sickness, not usually

SWEATSHOP SYSTEM, the name applied to an industrial policy by which the manufacture of goods is carried on outside of the owner's premises, under conditions so unfavorable that they have aroused vigorous public protest. The name sweatshop suggests a place of grinding toil; the system, known also as the sweating system, has for its victims poor people who, under its unrestricted operation, have no means of escape from despair.

fatal, is called miliary fever.

The manufacturers of clothing instituted the policy by contracting for the making of much of their product outside their own shops. Rents were saved, responsibility was shifted, management expenses were decreased, and factory laws evaded. The manufacturers prob-

ably did not foresee the evils which would result from the contract system. Under that system, a man or firm receiving a contract will sublet it to the owner of a small shop in a tenement district, where the people are in the grip of poverty and where labor is therefore cheap. The owners of such shops take contracts at as high prices as they can force from the middleman, and pay their employees on a piecework basis, giving them little more than enough to keep them alive. Working for so little, the employees often spend from twelve to eighteen hours a day at their tasks, to make their weekly wage as large as possible.

Another side of the system affects the home even more directly. Often a contractor will give work to a man who takes it into his home. His house becomes little better than a workshop, and he presses his family, even including little children, into the daily labor, and here, too, hours of work may extend into the night.

The sweating system is thus charged with overcrowding in shops, developing insanitary conditions, forcing children into labor without safeguards, and causing an increase in disease and deformity, due to confinement. The helpless workers are unable to improve their condition within their own ranks, because they are scattered and their employment is irregular. Complaints may deprive them of even the

slight income they are able to earn.

The foregoing description pictures the system in its worst aspect in great cities, but the statement is not overdrawn. So scandalous have conditions become that thousands of people have pledged themselves not to purchase clothing made under the contract system. Public attention was first called to the matter when it was found that disease germs from the tenements were carried in the new clothing manufactured under the sweating system. Legislatures have taken official notice of the evil, and in some states have remedied conditions by laws which require light, airy, roomy buildings, reasonable hours of labor, regular inspection of machinery and premises, and restrictions upon the employment of children. In a large number of states which are highly industrial, the laws provide that all rooms where such work is performed shall be licensed and regularly inspected. There has also been a growing tendency toward reform, within recent years, among manufacturers themselves. Many of the largest clothing-producers have equipped buildings with plenty of room and every modern device, in order to provide security and health, and wages at present assure improved living.

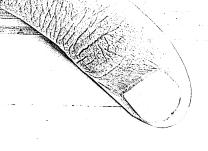
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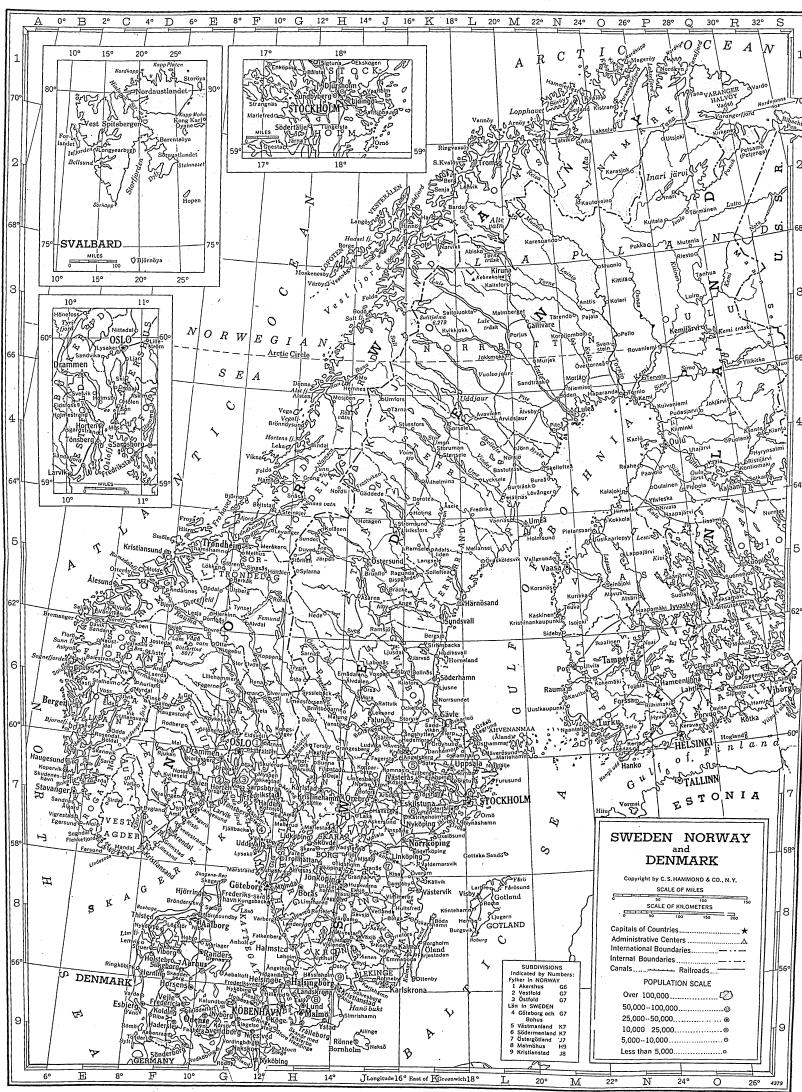
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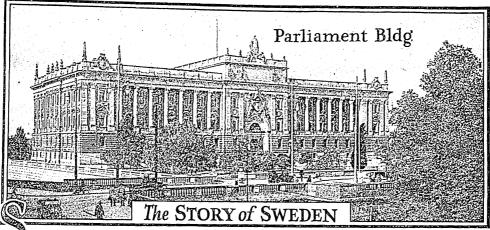


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Åseda, 1,107J 8	Hjo, 2,890 J 7 Hjoganäs, 6,915 H 8 Holmsund, 3,729 M 5 Hornsland	Mjölby, 5,947	Strämbacka K 6 Strangnas, 1,437 G 1 Strömstad, 3,167 G 7 Strömsund, 1,022 K 5
	Höganäs, 6.915	Mölndal, 16,646	Strangnas, 1,437
Åsele, 6,225	Holmound 3 720 M 5	Mora, 9,783. J 6 Morjärv, 1,793. N 3 Motala, 6,522. J 7 Muonio River. M 2	Strömstad 3 167 G 7
Askersund, 2,220	Tr	Manifers 1 702 N 3	Strömeund 1,022 V 5
Acnon (lalea) I 8		Wiorjary, 1,793	Stromsund, 1,022
AvavikenL 4	Hotagen, 1,091	Motala, 6,522	Stussfors. K 4 Sulitjelma (mt.). K 3
Assesse E 410 I 6	HotingK 4	Muonio River	Sulitjelma (mt.)
Avesta, 5,416	Hudiksvall 7 443 K 6	Willings	Sundbyberg, 8,753 G 1
Avesta, 5,418	Hultsfred, 1,940 K 8	Naggeryd J 8 Nässjo, 9,423 J 8 Niemisel N 3	SundetH 5
Bastuträsk, 1,912 4	Truitsired, 1,940	Nässio, 9,423	Sundsvall, 18,446K 5
Berga	Huskvarna, 8,602J 8	Nassjo, 9,423	Sunusvan, 10,440
Bargeiö 4 113 K 5	Järna, 760	Niemisel	Sunne, 1,822
Diade-	Järpen	Nora. 2.745	Svanstein, 2,413
Dispgarden	Tärveä 7 077 K 6	Norrkoning 68 474 K 7	Sver 3 534 J 5
Berga. J 8 Bergsjö, 4,113 K 5 Bispgarden. J 5 Böda, 1,581 K 8	T-1-1 1-1- 0 600 T 7	Norrsundet	SylarnaH 5
Boden, 6,594	JOKKMOKK, 8,099	Norrsunget	Sylama
Bofors J 7	Järpen	Norrtälje, 4,879L 7	Sysslebäck H 6 Tärendö, 2,164 N 3
Bollnås, 11,518 K 6	Jörn, 5,579	Norsjö, 709 L 4	Tärendö, 2,164
Donnas, 11,510	Kalix River	Nybro, 4,473 J 8 Nyköping, 12,446 K 7	Tärna, 2,083 J 4 Tidaholm, 4,443 J 7 Tierp, 5,541 K 6 Tillberga K 7
Boras, 46,168. H 8 Borgholm, 2,041 K 8 Borlänge, 2,683 J 6 Bräcke, 2,573. J 5	Kalixfore 1 208 T 3	Nyköping 12 446 K 7	Tidaholm 4 443 J 7
Borgholm, 2,041	77:11-21-	Numbehama 4 202 I 7	Tierp. 5.541 K 6
Borlänge, 2,683	Kalivik	Nynäshamn, 4,303 L 7 Ockelbo, 9,034 K 6	Title, 3,341 It o
Bräcke, 2.573	Kalmar, 20,691	Ockelbo, 9,034	Tillberga
Brinthodarne H 6	Kalix River N 3 Kalixfors, 1,298 L 3 Källvik K 8 Kalmar, 20,691 K 8 Kalmar Sound K 8 Karesuando, 1,152 M 2 Karlsham 10,010 L 8	Öland (island) 8	Torne River
D 4 - 2 502 I F	Karesuando, 1.152 M.2	Örbyhus	Towns trials (lales) I 2
Brintbodarne H 6 Brunflo, 2,582 J 5 Bureå, 6,265 M 4	Karlshamp 10 010 I 8	Örebro 46 406 II 7	Torshy 1 020 H 6
Burea, 6,265	Karlshamn, 10,019J 8 Karlskrona, 27,827K 8	Öregrund, 1,238L 6	Tb-110 1 054 V 7
BurgsvikL 8 Burträsk, 9,943 M 4			Torsby, 1,020. H 6 Torshalla, 1,854. K 7 Trälleborg, 13,916. H 9 Tranås, 6,840. J 7 Trollhätten, 15,712. H 7 Trosa, 856. K 7
Burträsk, 9,943, M 4	Karlstad, 27,599	Ornö, 419 H 1	Traileborg, 13,910
Byske River	Katrineholm, 10,239 K 7 Kattegat (sea) G 8 Kebnekaise (mt.) L 3	Urnskoldsvik, 5.377 L. 5	Tranăs, 6,840
Charlottonhour 1 070 U 6	Kattegat (sea)	OrreforsJ 8	Trollhätten, 15,712 H 7
Charlottenberg, 1,078 n o	Kehnekaise (mt) I 3	Orsa, 971	Trosa 856 K 7
Dalby, 3,741	Tr:1 062	Osber 5 170 T 0	Tun-malata II 1
Dannemora, 1,062 K 6	Kil, 863 H 7	Osby, 5,170	Tungelsta
Deie	Kilaiors	Oskarsnamn, 8,003 8	Uddevalia, 15,969
Diursholm 6411 H 1	Kilafors	Oster Dal (river)	Uddjaur (lake) 4
Doroton 4712 V 4	Kisa, 1,417	Öster Dal (river) H 6 Östersund, 15,486 J 5 Östhammer, 1,230 L 6	Uddjaur (lake). L 4 Ullared, 744 H 8 Ulriceham, 4,436 H 8
Dolotea, 4,712	Klintehamn I. 8	Östhammer, 1,230 I. 6	Ulriceham 4.436 H 8
Duved	Koläsen H 5	Ottonby V 8	Ulriksfors
Ed, 475	TOTAL COOR	Ottenby	TI Diama T
Edsbyn	Koping, 0,393	gvertornea, 5,551	Ume RiverL 4
Edsbyn	Köping, 6,393 J 7 Kopparberg, 2,015 J 7 Korpilombolo, 3,112 N 3	Overum, 1,50/	Umeå, 13,016
Emådalen I.6	Korpilombolo, 3,112N 3	Oxelösund	Umfors
Emmehada 1 262 I 0	KostaJ 8	Pajala, 5,459	Uppsala, 36,547L 7
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Emådalen. J 6 Emmaboda, 1,262. J 8 Enkoping, 5,959. G 1 Eskilstuna, 38,044. K 7	KostaJ 8 Kristianstad, 15,072J 9 Kristinehamn, 13,187H 7	Dites 3 407	Vadstena, 2,960J 7 Valdemarsvik, 2,730K 7
Eskilstuna, 38,044 K. 7	Kusunenanni, 15,167fi /	Fitca, 5,407	Valdemaisvik, 2,750 7
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FagerstaJ 6 Falkenberg, 5,895H 8	Kvikkjokk, 253 K 3	Ramnas, 2,380 J 7	VannasL 5 Vansbro, 1,446
raikenberg, 5,695, n 8	LabonåsJ 6	Ramsala 4 334 K 5	Vara, 2,268
Falköping, 8,594	T - L - 1 0 646 TY 0	D:: 1764	Vala, 2,200
Falun, 13,692	Labonås J 6 Laholm, 2,646 H 8 Lainio River N 3	Ramhall K 6 Ramnas, 2,380 J 7 Ramsele, 4,334 K 5 Ramsjö, 1,764 J 5 Rattyik, 8,578 J 6	Varberg, 9,518
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rimpstau, 4,595	LangshyttenK 6	Ronneby, 5.945J 8	Vastervik, 12,713K 8 Vättern (lake)J 7
Fingspäng, 6,543	Table 4 (distance)	Come 2 677	vallern (lake)
Fiallbacka G 7	Lapland (district)M 2 Larbro, 1,383L 8	Roma, 787. L 8 Ronneby, 5,945. J 8 Säffle, 3,677. H 7	Vaxholm, 2,923 H 1
Flen. 2.696 K 7	Larbro, 1,383.:L 8	Sala, 7,942	Vaxjö, 9,831
Fredrika 1 752 T A	Laxa	SaltoluoktaL 3	Vetlanda, 3.820 J 8
Frontiilen 2 400		Saltsjöbaden, 3,304 H 1	Vilhelmina, 1,018K 4
1 105 LVIKUII, 2,499	Leksand, 9,673 J 6		
	Laxa	Sandträck M 2	
Frovi, 847	Leksand, 9,673J 6 Lidingö, 11,015	Sandträsk	
Flen, 2,696. K 7 Fredrika, 1,752 L 4 Frostviken, 2,499 J 4 Frovi, 847 J 7 Furusund L 7		Sandträsk	
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Furusund		Sandträsk	
Gäddede. J 4 Gällivare, 1.926 M 3	Lindesberg, 3,641. J 7 Linköping, 34,278 K 7	Sandträsk	
Gäddede. J 4 Gällivare, 1.926 M 3	Lindesberg, 3,641. J 7 Linköping, 34,278 K 7	Sandträsk	
Gäddede. J 4 Gällivare, 1,926. M 3 Gamleby, 3,269. K 8 Gäyle. 39.574. K 6	Lindesberg, 3,641. J 7 Linköping, 34,278 K 7	Sandträsk	
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Furusund. L 7 Gäddede. J 4 Gällivare, 1,926. M 3 Gamleby, 3,269. K 8 Gävle, 39,574. K 6 Gnesta. G 1 Gota River. H 7	Limmared. H 8 Lindesberg, 3,641. J 7 Linköping, 34,278. K 7 Linugarn. L 8 Ljungby, 4,831. J 8 Ljungby, 4,831. J 8 Ljungby, 6,966. J 6	Sandträsk. M 3 Sandviken, 12,970. K 6 Sarna, 2,164. H 6 Särö. G 8 Säter, 2,224. J 6 Sävsjö, 1,466. J 8 Sigtuna, 1,177. H 1 Simrishamn, 2,613. J 9	Vimmerby, 3,682. J 8 Vindel River. L 4 Visby, 11,673. L 8 Vislanda, 2,511. H 8 Voim sjo (lake). K 4 Voxna, 1,774. J 6 Vuolvo jaure (lake). L 3 Ystad, 11,169. H 9
Gäddede. J 4 Gällivare, 1.926 M 3	Limmared	Sandträsk. M 3 Sandviken, 12,970. K 6 Sarna, 2,164. H 6 Särö. G 8 Säter, 2,224. J 6 Sävsjö, 1,466. J 8 Sigtuna, 1,177. H 1	Vinmerby, 3,082. J 8 Vindel River. L 4 Visby, 11,673. L 8 Vislanda, 2,511. H 8 Voim sjo (lake). K 4 Voxna, 1,774. J 6 Vuolvo jaure (lake). L 3



WEDEN, a kingdom of Northern Europe, occupying the eastern and larger portion of the Scandinavian Peninsula. Because of the great number of lakes, rivers, and watery lanes in the country, it has been called "a vast fresh-water archipelago," and there is an old saying that when God divided the water from the land, Sweden was overlooked.

Size and Location. Sweden covers 173,000 square miles. It is almost 200 miles longer than the state of California, but is not so wide. About one-twelfth of the total area is under water. The seacoast extends 1,400 miles when measured in a straight line, but, although the bays and indentations are not so numerous or deep as those of Norway, the coast is penetrated by many inlets, and over 4,700 miles are washed by the sea. The Gulf of Bothnia, on the east, separates Sweden from Finland, and across the Baltic Sea lie the Union of Soviet Socialist Republics and Germany. The southern end of Sweden almost touches Denmark across the Sound; the Kattegat and Skagerrak, invading the Scandinavian Peninsula on the south, separate the southernmost areas of Sweden and Norway.

The People. The Swedes are an enlightened and educated people, and with the other Scandinavians are among the world's progressive peoples. They are more vivacious and light-hearted than their western kinsmen, the Norwegians, but they have the same reputation for frankness honesty and industry.

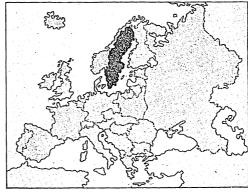
utation for frankness, honesty, and industry. Although large numbers of Swedes emigrated to northwestern United States, the population has doubled in the last century. According to the 1930 census, it was 6,141,571; and estimated at 6,370,538 in 1940. With the exception of 34,000 Finns, 6,500 Lapps, and a few thousand foreigners, the entire population is Scandinavian. About 64 per cent of the inhabitants live in the rural districts.

The Cities. Stockholm, the beautiful capital, is described in these volumes under its title.

Other cities of importance are described below.

Gothenburg, got' en burg, official Swedish spelling, Göteberg, next to Stockholm, is the largest and most important city, and the country's chief port on the Kattegat. It is connected by the scenic Göta Canal with Stockholm, on the Baltic coast. The chief industries are cotton-spinning, sawmilling, shipbuilding, and the manufacture of iron and steel. An extensive trade is conducted; the harbor, which is now the largest in Sweden, is rarely blocked with ice. Gothenburg handles the largest amount of tonnage, in both domestic and foreign trade. This picturesque port is the landing place for foreign tourists. The city has an excellent university supported by private funds; and technical, nautical, and commercial schools. Population, 281,302 (1941).

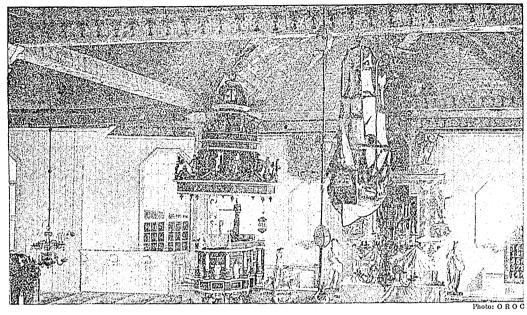
Malmö, mahlm' uh, is a seaport town, ranking next in importance to Gothenburg and Stockholm, and lying on the opposite shore of the Sound from



LOCATION MAP

The boundaries of Sweden place it in the rank of one of the small countries of Europe, but its commercial importance is not to be measured by its size.

Copenhagen, in Denmark. It is situated on a level plain and was formerly strongly fortified, but the only fortification now remaining is the citadel where the Earl of Bothwell, husband of Mary Queen of Scots, was imprisoned from 1567 to 1573; this is now used as a prison. Thousands of vessels leave the



A SHIP MODEL IN A CHURCH

A feature common to many churches in Sweden is a miniature ship, hung from a central rafter. It calls to mind the fact that the ship model originated from the ancient Roman custom of hanging sea-stained garments in the Temple of Neptune as an offering for mercy from the god of the sea. As centuries passed and forms of worship changed, the first miniature ships were made and suspended from the softly lighted arches of old churches. These are known as votive models. The custom described is followed to some extent in Norway.

docks of this busy seaport each year, carrying the city's exports of grain, flour, gloves, chocolate, etc., to many European cities. Malmö is the terminus of eight railway lines. Its town hall is an example of Renaissance architecture of the year 1546. Population, 155,465 (1941).

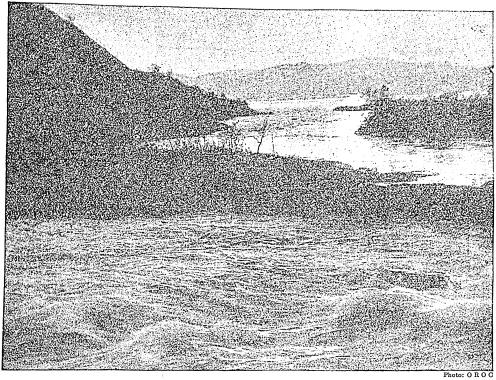
The Swedish language is a Language. North-Germanic tongue, and it closely resembles the Danish. It has, however, a more delicate and musical accent than the Danish, and not only the correct pronunciation, but the very meaning of the word, depends upon the accent or variation in the tone of the voice.

Literature. Sweden has produced some of the world's greatest thinkers and literary men, among whom are Bellman, the national poet, Swedenborg, a religious philosopher, and Linnaeus, the naturalist. Swedish literature had its beginning in the written laws of the thirteenth century, and the earliest verse consisted of the popular ballad and folk song of the fifteenth century. The Renaissance and Reformation, which so greatly influenced the literature of continental Europe and England, were scarcely felt in Sweden and Norway. Swedish literature reached its height during the reign of Gustavus III, himself a writer and great patron of learning. This was the age of Bellman, Swedenborg, and Linnaeus. At the close of the nineteenth century, which produced the poets Tegnér, Stagnelius, and Runeberg, the modern spirit of realism swept over Sweden. The greatest writers of the modern period include Strindberg, the radical dramatist, and Selma Lagerlöf, a novelist, who won the Nobel prize for literature in 1909.

Education. Illiteracy is almost unknown in Sweden. Education is free and compulsory, and an excellent school system is maintained, under governmental supervision. There are many special schools. Two national universities, the Royal University of Uppsala and the Royal University of Lund, are among the oldest universities in Europe. Uppsala was founded in 1477 by a bull of Pope Sixtus IV, and Lund was founded in 1666. The Caroline Medico Surgical Institute at Stockholm is, also, a national university. In addition, there are two private universities, at Stockholm and at Gothenburg.

Religion. Most of the Swedish people are members of the Swedish Lutheran Church, which is the State Church. The clergy are supported by the parishes and by the sale of Church lands. With the exception of the Mormons, who were expelled in 1912, all denominations are tolerated. Among the dissenters, the Baptists and Methodists are most numerous.

Physical Features. The Land. The mountainous sections of Sweden are confined to the northern part of the country, called Norrland, and to the range of rocky precipices and mountains along the Norwegian frontier. The most rugged scenery and highest peaks are in the north, where the lofty, snow-crowned Sarjektjokko and Kebnekaisse rise about 7,000



THE MIDNIGHT SUN IN SWEDISH LAPLAND

Here for a part of the month of June the sun does not set, and until late in August there is only a short twilight. But, on the other hand, what an opportunity, later, to sleep when the nights are two months long!

feet. This northern section is a region of great forests. Among the deep ravines and steep precipices of the mountains are many long, narrow lakes, whence rise innumerable torrents which scar the long eastern slopes of Sweden, and in the lowland sections widen into broad channels and lakes. Central Sweden is a region of rolling, forest-clad hills, green meadows, and beautiful lakes. In the extreme south lie the fertile plains of Scania, the best agricultural region in the country.

The wooded and rocky coast of Sweden is picturesque, but it has not the rugged grandeur of the fiords of Norway. The entire eastern coast is penetrated by bays and sounds, and is bordered by many islands, which are most numerous near the city of Stockholm. Gotland and Öland, two of the largest islands in the Baltic Sea, belong to Sweden. The coast and islands of the Gulf of Bothnia are rugged, but not lofty. On the Baltic, gleaming white klints, or cliffs, alternate with low beaches, but gloomy fields of bare cliffs border the shores of the Kattegat and Skagerrak, and dangerous rocks lurk just below the surface of their waters.

Rivers and Lakes. Most of Sweden's many rivers rise from lakes in the highlands along the Norwegian border, and flow southeast to the Gulf of Bothnia and the Baltic Sea. Among

the largest of these rivers are the Tornio, flowing 250 miles through large lakes and forming the boundary with Russia; the swift Lulea; the Pite; the Skellefte; the Indals; the Dal, and the Angerman, which is navigable for seventy miles by seagoing vessels. The Klar, rising in Norway, flows south to Lake Vänern, and the Göta, the most important commercial river, flows from Lake Vänern to the Kattegat. Six beautiful falls in the latter river, at Trollhättan, furnish 700,000 horse power. Navigation is extended beyond the falls by means of locks, and the river, connecting with canals and lakes, forms a water boulevard across the country (see *Transportation*, below).

The numerous picturesque lakes, bordered by wooded shores, not only furnish some of the greatest beauties of Swedish scenery, but also are of vast importance in navigation, and they abound in fish. The lakes of the lowland region are larger than the mountain tarns. Lake Vänern has an area of 2,114 square miles; Lake Vättern, of 715 square miles. Other large lakes are Hjelmar and Mälar; the latter washes the shores of 1,300 islands, and on its own shore Stockholm, "the Venice of the North," is situated.

Climate. The country occupies the leeward section of the Scandinavian Peninsula, and no

part of Sweden has so equable a climate as that of Southern Norway, where the seasons are tempered by the Atlantic winds. There is a wide difference between the annual temperature of the northern part of the country, which lies within the Arctic Circle, and that of Scania, which is 900 miles farther south. Winters in the north last nine months, and in the south they are only two months shorter. The seasons of spring and autumn are very

short, and in some regions are lacking altogether. At Stockholm the average temperature for July is 62°, and for January 27°. The rainfall averages about twenty inches. It is heaviest during August, and the greatest amount falls in the south. In the northern part of the country, the precipitation rarely exceeds thirteen inches.

Industries. Agriculture. Sweden has always been predominantly an agricultural country, but the recent development of manufacturing and other industries has divided the population equally between farmers and other workers. The farms are generally small, ranging from five to fifty acres, and

are owned by independent farmers. Scania and the Baltic islands are the most productive regions. Much of the marshland in the low-lands is being reclaimed and cultivated. The principal crops are hay and fodder roots, potatoes, sugar beets, oats, barley, wheat, and corn. Barley is the only cereal raised in the north, and the cultivation of sugar beets is largely confined to Scania and Gotland, the latter the most valuable of the Baltic islands.

Southern Sweden is also a rich pastoral region, where cattle-raising and the herding of swine are important; quantities of dairy products are exported to England and Denmark. Small bits of natural pasture are found throughout the country; goats are herded on the hilly slopes, and even in the far north, herds of reindeer find sufficient grazing to keep the nomadic Lapps in food and clothing.

Sweden has attained high efficiency in agriculture. It has a state department devoted to its development, and maintains many agricultural schools and societies. Horticulture is also important; there are large botanical gar-

dens at the universities, and nurseries are maintained by the government. Primitive methods of cultivation are now seen only in isolated districts.

Forests. More than one-half of Sweden is timberland, and the extensive forests constitute the main natural wealth of the country. The uplands and mountains are clothed with dense growths of pine, spruce, birch, and mountain ash; thick groves of oak border the low-

land lakes, and beech forests separate the cultivated fields of Scania. The greater part of the woodland areas belongs to the Crown and is controlled by a well-organized forest service. Excessive cutting of timber and other abuses characteristic of America are prevented by law, and trees are grown faster than they are cut. An extensive area in the north has been made a national park, where hunting and logging are pro-hibited. There is an institute of forestry at Stockholm, and other minor forestry schools are maintained by the government.

Fisheries. The calm waters of the sea inlets are excellent fishing

are excellent fishing grounds, and sea fishing has long been one of Sweden's principal industries. Herring is the most important product, and there are large salmon fisheries in the mouths of the northern rivers. Sweden's export of salt and canned fish is not as large as that of Norway, and in recent years the annual catch has decreased in value. There are not nearly as many fish in Swedish as in Norwegian waters [see the article Norway (Fisheries)].

Mining. Sweden's mines are one of its chief sources of wealth. The northern and midland regions are especially rich in iron; with the introduction of modern machinery, the development of the mines has been rapid. Swedish iron ore is noted for its purity, and it excels that of any other European country. Millions of tons are exported annually. Copper, formerly mined extensively in Falun, has fallen off considerably in production. Deposits of silver, coal, lead, zinc, and sulphur pyrites are found in various parts of the country. There are schools of mining at Stockholm, Falun, and Filipstad.



Swedish girls making their way through the heavy snows of winter by means of poles and skis.

Manufactures. The vast power furnished by the southwestern rivers is being utilized for the development of large manufacturing industries. Factories are scattered throughout the small towns and rural districts, and a great many of the employees live in the country. In the north, especially along the Gulf of Bothnia, are numerous sawmills. Lumber and timber products, including furniture and paper, are important manufactures. There are iron-

smelting plants and foundries in the midland districts; and the porcelain and glass factories (see page 2828), flour and woolen mills, sugar refineries, leather and rubber plants, chemical factories, and electric and gas plants are also important. Troll-hättan, Norr-köping, Stockholm and Gothenburg are the chief manufacturing cities.

Transportation and Commerce. Besides 52,910 (1938) miles of roads and 10,486 (1938) miles of railroad, Sweden has 2,500 miles of inland waterway afforded by the many rivers, canals, and lakes. The Göta River, Lake Vänern and smaller lakes and canals

form a continuous thoroughfare from the Skagerrak to the Baltic; a total of only fifty-six miles of this consists of artificial canals, and in it there are fifty-eight sets of locks. As the Baltic Sea was unsafe for traffic during the World War, new railroad lines between Swedish cities and Russian ports were opened in 1915, and a railroad now encircles the Gulf of Bothnia, affording transportation from Stockholm to Leningrad. The rivers provide not only transportation, but also electrification for railways. See canal illustrations, page 1159.

The peacetime commerce of Sweden is exten-

The peacetime commerce of Sweden is extensive for a country of its size, and its large merchant marine, consisting of over 2,250 ships prior to World War II, carries much foreign as

well as domestic trade. In normal times Sweden's foreign commerce is carried on mainly with Great Britain, Germany, the United States, Denmark, and Norway. The chief imports are coal, metal goods, machinery, motor vehicles, raw textiles, and foodstuffs; and the principal exports are wood pulp, paper, and other wood products; iron ore, metal manufactures, and dairy products. The leading ports are at Gothenburg and Stockholm, but Malmö and

Hälsingborg are also important.

AND THE PROPERTY OF THE PROPER

Government. Sweden is a constitutional monarchy. The Constitution was adopted in 1809, and has been several times amended and modified. The executive power is vested in the king, who must be a member of the Lutheran Church. He is assisted by an administrative Council of State. The right to make laws is vested in the Diet, which consists of two chambers. In the upper chamber there are 150 members, elected for eight years by the municipal and provincial councils, or landsthings. The second chamber consists of 230 members, elected for four years by universal suffrage.



NATIONAL COSTUMES

Picturesque are the caps, bodices, and aprons of these girls of Central Sweden. Red, white, and black predominate in the colorful aprons.

The administration of justice is independent of the government. It is controlled by the king and represents the Crown; the Attorney-General, who is appointed by the Diet, has general supervision over all courts.

Local Government. There is a high governor at Stockholm and a prefect, nominated by the king, in each of the twenty-four provinces. In all communes and municipalities, women taxpayers as well as the men have the vote, and are eligible to communal office. The communal assemblies and city councils decide all questions of local administration. Religious affairs and elementary education are controlled by parish assemblies. Liquor traffic is rigidly

controlled by the government. Spirits may be sold only by responsible societies, and the profits go to the municipality.

History. Early Growth of the Kingdom. Much of Sweden's history before 1000 A.D. is



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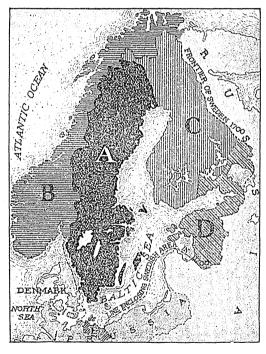
PUBLIC TELEPHONE BOOTH

The booth shown is typical of those found everywhere in Sweden. Sweden has more telephones in proportion to population than any other country except the United States. The telephone system is governmentowned.

legendary. Christianity was introduced in the middle of the ninth century, but was not fully established until the eleventh century, during the reign of Olaf, who defeated Norway and made Sweden the mightiest kingdom in the

north. During the next 200 years, Sweden's history is a story of the warfare between the Swedes in the northern part of the country and the Goths in the south, and between both of these peoples and the Danes. About the middle of the twelfth century, the government and the Church were organized, and under the kings Sverker, Eric IV, and Charles VII, Sweden's political and economic development began.

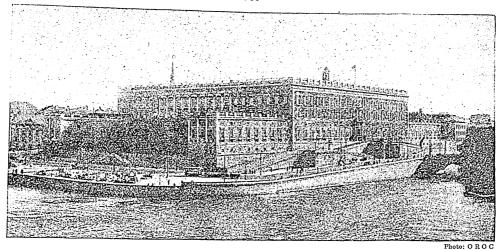
In 1397, by the Union of Kalmar, Queen Margaret of Denmark and Norway united Sweden with the other two Scandinavian countries under one rule [see Norway (History)]. The Swedes were restive under the predominance of Denmark, and in 1523 they broke away from the Union and elected Gustavus Vasa king of Sweden. During the reign of this great sovereign, the Reformation spread to Sweden, and Lutheranism was made the State religion. From this time, development was rapid, though prosperity was temporarily disturbed by the religious struggles of the succeeding reign.



HOW SWEDEN DECREASED IN SIZE

This map shows how Sweden, once the first military power in Europe, has lost territory from time to time. (A) Present area of Sweden; (B) Norway, lost in 1905; (C) Finland, lost in 1809; (D) area lost in 1721; (E) Western Pomerania, lost in 1814.

Sweden Becomes a Great Power in Europe. Under Gustavus Adolphus (1611-1632), Sweden became one of the greatest European military powers and commercial countries. This king's ambition for territorial expansion



THE ROYAL PALACE IN STOCKHOLM

An impressive group of buildings in the Renaissance style, built around a large square court. Besides being the residence of the royal family, it contains art collections of great value.

and his Protestant faith drew him into the war in Germany. The policy of Gustavus



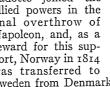
"THE SWEDISH NIGHTINGALE" A statue of Jenny Lind, in a park in Stockholm. [See Lind, Jenny.]

Adolphus was continued after his death; new territory was acquired, and for some years Sweden was recognized as a great power, but in 1675 its forces were completely defeated by Frederick William of Brandenburg, its sea power was lost, and ruin was only averted by the treaty of peace.

The eyes of all Europe were again turned on Sweden during the reign of Charles XII, who invaded Denmark, Poland, Russia, and Norway. Following his death, Sweden was weakened by political struggles, and even Gustavus

III (1771-1792), who wiped out the factions and increased the royal power, was unable to restore Sweden to its former prosperity.

Relations with France. Charles XIII (1809-1818), having no heir, chose Bernadotte, one of Napoleon's marshals, as crown prince. Bernadotte joined the allied powers in the final overthrow of Napoleon, and, as a reward for this support, Norway in 1814 was transferred to





KING GUSTAF

Sweden from Denmark, for the latter country had united with Napoleon. Bernadotte came to the throne in 1818 as Charles XIV John, and during his reign and those of the succeed-

ing kings, Sweden prospered.

Recent History. In 1905 King Oscar II refused to give Norway a separate consular service. Norway then declared its independence, but preserved friendly relations with Sweden. Two years later, Gustaf V succeeded to the

OUTLINE AND QUESTIONS ON SWEDEN

Outline

I. Location

- (1) Latitude, 55° 20′ 18″ to 69° 3′ 21″ north
- (2) Longitude, 11° 6′ 19" to 24° 9' 11" east
- (3) Boundaries
- (4) Relation to other countries

II. Size

- (1) Length
- (2) Breadth
- (3) Actual area, 173,000 square miles
- (4) Comparative area

III. The People and Cities

- (1) Population
 - (a) Increase in spite of emigration
- (2) Racial peculiarities
- (3) Language and literature
- (4) Religion
- (5) Education
- (6) Cities

IV. Geographic Features

- (1) Coastal peculiarities
- (2) Mountains
 - (a) Location
 - (b) Greatest heights
- (3) Rivers
 - (a) Canal connections
- (4) Lakes
 - (a) Economic importance
- 5) Climate
 - (a) Moderating influences
 - (b) Differences due to latitude

V. Resources and Industries

- (1) Agriculture
 - (a) Regions where it is practiced
 - (b) Chief crops
- (2) Forests
- (3) Fisheries
- (4) Mines
- (5) Manufacturing

VI. Transportation

- (1) Railroads
- (2) Rivers and canals
- (3) Commerce

VII. Government and History

- (1) Form of government—constitutional monarchy
 - (a) Executive
 - (b) Legislature
 - (c) Judiciary
 - (d) Local government
- (2) History
 - (a) Early years
 - (b) Union with Denmark and Norway
 - (c) Sweden at the height of its power
 - 1. Gustavus Adolphus
 - 2. Charles XII
 - (d) Napoleonic Era
 - (e) Later nineteenth century
 - (f) Separation from Norway
 - (g) World War
 - (h) Later history

Questions

What is meant by the expression "fresh-water archipelago" as applied to Sweden? How does the outer coast line of Sweden compare with that of Norway in length? How do the two compare if all the indentations are counted?

What Swedish author won the Nobel prize, and when?

How long is a summer day at Stockholm?

How long is a summer day in the most northern part of the country?

What are the klints, and where are they to be found?

What is "the Venice of the North," and why is it so called?

Why is the climate more extreme than that of Norway, which is in the same latitude?

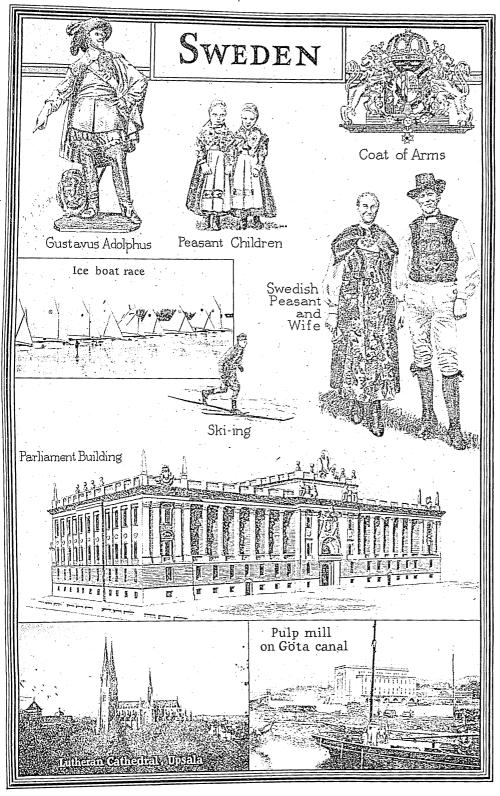
What king raised Sweden to a place of power among the nations of Europe?

Why did Norway separate itself from Sweden?

How was Sweden affected by the World War?

What marriage indicated the friendly feeling now existing between Norway and Sweden?

In the churches, what are "votive models"?



AND THE PROPERTY OF THE PROPER

HISTORY

Swedish throne. His long, peaceful reign was marked by the rapid growth of democracy in economic and social life as well as in politics. The Social Democrats won control of the government for the first time in 1920, and have remained the most influential party ever since. With their aid, great housing and social insurance programs were placed in effect. The co-operative and temperance movements made notable progress. Industry and commerce pros-

pered. Sweden became famous for its success in providing the people with both political liberty and economic security.

This remarkable progress received a temporary setback during World War I. Sweden suffered severely from the Allied blockade and the German submarine warfare. Foreign trade was almost completely cut off. Industry was paralyzed, and an acute food shortage developed. Both sides threatened to attack Sweden. By adopting a

policy of armed neutrality, the Swedes kept out of the war, but suffered more than some of the warring nations.

When peace came, Sweden again made rapid progress until the world-wide economic depression of 1929-1933 brought widespread unemployment and difficult financial problems. Sweden recovered more rapidly than most countries, however, and during 1934-1939 enjoyed one of the most prosperous periods in its history. This was ended by the outbreak of World War II, which plunged Sweden into a more serious crisis than that of 1914-1918.

Following their traditional policy of peace through armed neutrality, the Swedes in 1940 rejected appeals for military aid from both the Finns and Norwegians. But the Red Army's victory over Finland revived Sweden's old fear of Russian aggression. Moreover, the German occupation of Norway cut Sweden off from the western democracies and forced it to lean more and more upon German economic assistance and military aid against Russia. The Swedes were compelled, among other things, to let Nazi Germany control their trade with most of the European continent. W.F.B.

Related Subjects. The reader is referred to: COAST WATERS

Baltic Sea Bothnia, Gulf of

Charles (IX, X, XI, and XII) Denmark (History) Gustaf V Gustavus (I, II, III, and IV)

Norway (History) Oscar (I and II) Thirty Years' War World War LEADING PRODUCTS

Kattegat

Skagerrak

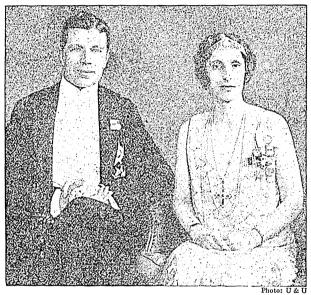
Herring Iron Lumber Rye

SWEDENBOR-GIANS, swe denbawr' jih anz, the religious body, established in London, 1782, that accepts the teachings of Emanuel Swedenborg. Their belief, as set forth in Swedenborg's writings, regards the universe as one whole, the outward world being the counterpart of the inner and spiritual. Beneath the literal meaning of the Bible is the spiritual meaning, which is open to those

who have inner discernment. Justification is not attained by faith alone, but whoever fears God and works righteously shall be saved: God is one and the real Trinity is in Christ. The last judgment has already taken place, and the New Jerusalem is descending in the form of the New Church, considered as a dispensation. There is no physical resurrection, but at death men's eyes are opened to the spiritual world, of which they are already a part. They are drawn to heaven or hell by their characters as fixed in the world. Angels are human beings fitted for heaven.

The first Swedenborgian Church in the United States was organized in Baltimore, in 1792. The American societies are grouped into state organizations called associations, and the General Convention of the New Jerusalem Church is composed of twelve of these associations, and of seven separate societies. is a smaller organization of the sect, known as the General Church of the New Jerusalem.

Emanuel Swedenborg (1688-1772), scientist, philosopher, and theologian, was born in Stockholm, Sweden, the son of a Lutheran bishop. After studies abroad he was appointed a member of the State



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THE FUTURE RULERS OF SWEDEN Crown Prince Gustavus Adolphus and Crown Princess Louise Alexandra.

Board of Mines; meanwhile he published numerous scientific and philosophical treatises on a great variety of subjects. He is credited with having been the

originator of the nebular hypothesis, the founder of the science of crystallography, and the maker of the earliest complete sketches of an airplane and of the airtight stove. Swedenborg is also believed to have discovered the functions of the ductless glands and to have anticipated modern physiology in tracing the circulation of the cerebrospinal fluid. In 1745 he turned to religion and although he never preached, nor intended to organize a new religious body, about ten years after his death



Photo: Brown Bro

SWEDENBORG

readers of his works in London, England, founded the New Jerusalem Church, or Swedenborgian. Of Swedenborg's more than two hundred titles, his principal theological works, now published in many languages, include True Christian Religion, Heaven and Hell, Marriage Love, Divine Providence, the Arcana Coelestia, and Divine Love and Wisdom.

SWEDISH NIGHTINGALE, a name applied to Jenny Lind (which see).

SWEET ALYSSUM, a lis' um, a low, spreading plant of the mustard family, bearing clusters of tiny white flowers, and having four-sided stems which contain a bitter juice. It is a hardy, blooming until late in the fall. There are single and double varieties; some are dwarfed, and others grow eight or ten inches high.

B.M.D.

Scientific Name. Sweet alyssum is Lobularid maritima; it belongs to the family Cruciferae.

SWEET BAY. See Laurel; Magnolia; Bay Tree.

SWEETBREADS, the two lobes of the thymus gland, found below the throat of a calf, which are valued as a meat delicacy. In the suckling calf there is not much difference in the appearance of the lobes, and the heart sweetbread is the tenderer, but as he matures the neck "bread" decreases in size while the heart bread becomes fatter. About two thirds of all the sweetbreads on the market come from veal. Young beef furnishes most of the remainder, as the thymus glands of pigs and lambs are too small to have commercial value.

The term stomach, or liver, sweetbread is occasionally applied to the pancreas (which see). Although one of the more easily digested meats, it is not often available to the consumer; most of the supply is used to make insulin, and in chemicals and tanning compounds.

Preparing Sweetbreads. Sweetbreads should be simmered for about twenty minutes in water

to which one teaspoon of salt and one tablespoon of vinegar have been added for each quart of water used. After this precooking, place them in cold water, to preserve the color, and then remove the membrane. Broiling, braising, breading and frying, and creaming are favorite methods of cooking.

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SWEETBRIER. See EGLANTINE.

SWEET CHERVIL. See CICELY, SWEET. SWEET CICELY. See CICELY, SWEET.

SWEET CLOVER. See MELILOT.

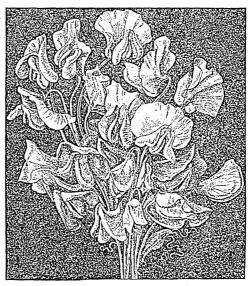
SWEET FLAG, a tall, reedlike plant of the arum family, which grows along brooks and in marshy places in almost all parts of the northern hemisphere. Its stiff stems are tipped by spikes of green blossoms, and it has flat leaves shaped like a two-edged sword. They spring directly from the tuberous rootstock, and grow to be two feet long. This rootstock is the aromatic calamus, prized for its tonic properties and used in making perfume.

B.M.D.

Scientific Name. The sweet flag belongs to the family Araceae. Its botanical name is Acorus calamus.

SWEET LOCUST. See HONEY LOCUST. SWEET OIL, any mild oil used for food; formerly, a popular name for olive oil (which see).

SWEET PEA, a favorite garden plant belonging to the same family as the edible pea. It is cultivated for the beauty and exquisite fragrance of its flowers, which are colored blue,



SWEET PEAS

red, purple, pink, and white, and in shape suggest the butterfly. In the year 1699, seeds of a white variety were sent to England from Sicily, and since that time numerous varieties have been developed by gardeners and florists in various parts of the world. In some varieties,

The seed should be sown in April, in the proportion of one ounce to thirty feet of row; plants should be at least two inches apart in the row, and the rows separated by four feet of space. As soon as the plants appear above ground, cultivation

should begin. The soil should

be stirred lightly

at least three

times a week,

preferably after a

rain, and the rows

should be kept

liquid manure and free watering

of the plants are necessary. Wat-

ering should be done as often as required, and

liquid manure,

which is plant

six times during

the season. This

plant food can be secured by putting a wheelbar-

row load of cow

manure in a bar-

rel, and filling the

free of weeds. Application of

the flower petals are smooth and velvety; in others, they are crinkled and wavy. There are two general types—the tall-growing and the dwarf. The former, which is the more popular, produces a rough, hairy stem that climbs by tendrils and needs support.

Cultivation. Successful cultivation of the sweet pea requires a rich, well-drained soil, plenty of sunshine, and free circulation of air.

CЬ α

DIAGRAM

Showing how to plant and stake the sweet pea. (a), one foot of food, should be fine garden loam; (c), nodules applied at least on roots of pea plant; (d), the six times during seed planted (summer) one inch deep in a furrow two inches be-low the surface edge of the trench; (f), surface soil to be leveled in as the plant grows; (g), furrow in which to apply liquid manure; (h), pea vine clinging to wire support; (i), wire, 4-inch mesh or chicken wire; (k), iron support.

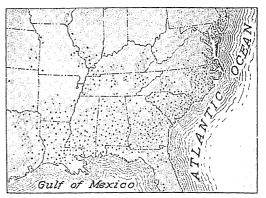
barrel with water. Keep the barrel covered, to prevent the entrance of insect pests. Stir the liquid three or four times, and then allow it to stand for a week. Then remove the froth from the top, and dilute the mixture until it is the color of verv weak tea.

The liquid should be poured into a trench dug three inches deep and four inches from the vines. The accompanying diagram shows how

to prepare the stakes for the vines. flowers should not be permitted to seed, but should be picked as they mature.

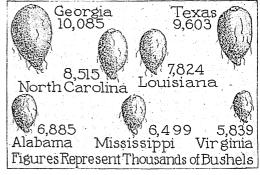
Scientific Name. Sweet peas belong to the family Leguminosae. The common garden species is Lathyrus odoratus.

SWEET POTATO, a plant belonging to the same family as the morning-glory, with long, creeping stems and heart-shaped leaves. It is



WHERE SWEET POTATOES GROW Where the dots are most numerous, the yield is greatest.

cultivated for its sweet, edible roots, whose resemblance to the common potato gave the plant its name. The edible part of the sweet potato, however, is a yellowish- or reddishskinned root and not a stem or tuber, as in the case of the common potato. The two plants belong to different families (see POTATO). There are two general classes of sweet-potato roots, with yellow and white flesh, respectively, but the yellow varieties are the most common.



PRINCIPAL CENTERS OF PRODUCTION The figures represent the average crops for three successive years.

The flesh is rich in starch and sugar, and is wholesome and digestible.

The plant is probably a native of America, but is now cultivated in warm countries all over the world. The most important sections in the United States, as may be seen from the

moore are supported a responsibility of the supported and the supp

accompanying diagram, are in the Southern states near the coast. In total production, the sweet potato ranks next to the white potato among American vegetable crops. Sweet potatoes thrive best in a warm, well-drained soil, and when the plants have gained a good start, they need little rain. They are grown from slips produced from roots, or from vine cuttings. The roots are usually harvested before frost, and will keep indefinitely if stored in a warm, dry place.

Scientific Name. The sweet potato belongs to the family Convolvulaceae. Its botanical name is Ipomoea batatas. It is a different plant from the yam, though the two names are sometimes confused. See YAM (Scientific Names).

SWEET SINGER OF ISRAEL, a name given to David (which see).

SWEET WILLIAM, one of the oldest garden flowers, a member of the pink family, ranging in color from white to dark red and purple. The fringed, velvety blossoms are crowded together in dense clusters at the ends of the stems; each cluster may be of one color,



SWEET WILLIAM

or a single stem may contain flowers of varied hues and markings. Sweet Williams grow readily from seed, in ordinary garden soil. Since the plants are biennials (which see), seedlings should be raised each year, to make sure of a continuous supply of flowers. See PINK.

B.M.D.

Scientific Name. The sweet William belongs to the family Caryophyllaceae. Its botanical name is Dianthus barbatus.

[For the wild sweet William, a different plant entirely, see PHLOX.]

SWIFT, a small bird with strong, flexible wings, but weak feet, various species of which are found in practically every part of the world. In color it is a sooty-brown or a greenish-black, some species having white throats or rumps. Swifts fly tirelessly all day, capturing their insect food while on the wing, and seldom alighting. At dusk, performing many graceful evolutions as they fly, they return to

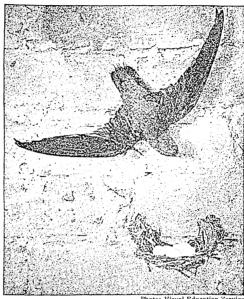


Photo: Visual Education Service

THE CHIMNEY SWIFT AND ITS NEST

the chimney, cave, cliff, or hollow tree, where they live in colonies or roost in flocks. Their notes, continuously repeated, are little more than chatterings. They build curious nests, in which sticks, leaves, etc., are cemented together with saliva, some being almost entirely composed of saliva, as the edible birds' nests of Eastern Asia. See Edible Birds' Nests.

The common American swift, a bird of Eastern North America, has been forced almost entirely to the chimney as a home, and is generally called *chimney swift* or, erroneously, *chimney swallow*. In perching, it clings to the wall with its feet, bracing itself with its spine-pointed tail. It breaks off the twigs for its nest with its beak, as it flies. The nest is semicircular in form, firmly cemented to the inside walls of some chimney not used during summer. The eggs are white in color and four to six in number. Two broods are usually reared in a season. Swifts are highly beneficial birds, as they feed wholly on insects.

Scientific Name. The swifts constitute the family Micropodidae. The chimney swift is Chaetura pelagica.

SWIFT, EURASIAN. See BIRD (Flight).

SWIFT, JONATHAN (1667-1745), an English satirist and clergyman, born in Dublin. He was unusually advanced as a child—could spell

at three, and at five could read any chapter in the Bible. At the Kilkenny School, and later at Trinity College, Dublin, where he was poorly supported by the charity of an uncle, his course of study was most irregular. History and poetry appealed to him, and he read them greedily, but for the set course of study he had nothing but scorn. In conse-



IONATHAN SWIFT

quence, it was only by special favor that he obtained his degree. During the Revolution of

1688, he fled to London.

Early Discouragements. At twenty-one he became secretary to Sir William Temple, of Moor Park, Surrey, at a salary of twenty pounds (\$100) a year. He was treated much as a servant, but though his pride was hurt, he retained his office for five years, finding some solace in the fact that he had much time to devote to study and writing. In 1694, in an attempt at independence, he accepted a small parish in the Irish Church, in a distant, secluded place, but his dissatisfaction was deeper than before, and in a short time he returned to the Temple household. Here he remained until Sir William's death. In Temple's family he became acquainted with a beautiful girl, Esther Johnson, who was to play so important a part in his life, and whom he made famous as the "Stella" of his writings.

His Literary Career. In 1699 Swift attended the Earl of Berkeley as secretary and chaplain on a journey to Ireland, and was made vicar of Laracor and Rathbeggan. During all his clerical career, he engaged in political writing, and in 1704 won wide fame on the publication of his Tale of a Tub, a humorous and forceful satire on insincerity and pedantry in literature and in theology. Such a work could not, however, fail to injure his chances for preferment in the Church. In the decade that followed, he became a conspicuous figure in politics. Beginning as a Whig, he became so opposed to the principles of his party that, in 1710, he turned from it entirely, making plain the change by accepting the editorship of the Tory Examiner. Through his essays, he exerted a strong influence on the trend of public thought, but in 1714 he shared the Tory loss of power, and was forced to content himself with an appointment to the deanery of Saint Patrick's, Dublin.

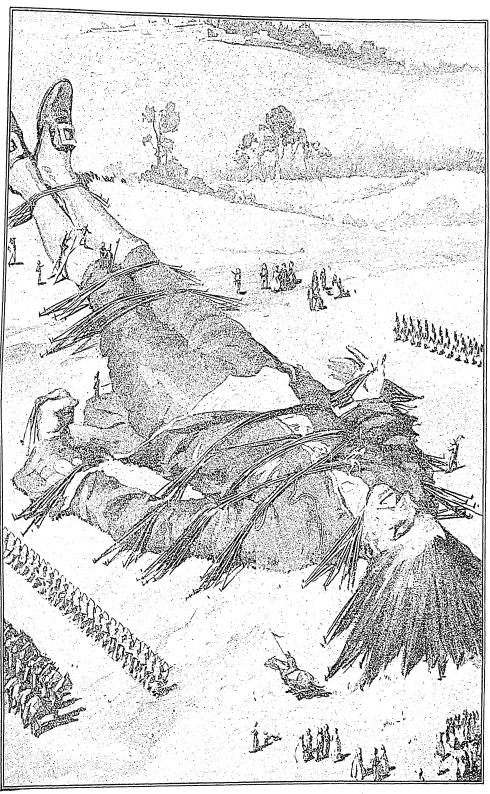
During his residence in Ireland, previous to 1710, Swift had urged Miss Johnson and her friend Mrs. Dingley to make their home near him, and thus he enjoyed a continuance of his early friendship. While he was in England, from 1710 to 1713, he wrote the letters that compose the Journal to Stella, a work of deep biographical interest. In the same period, he became involved in a connection with Miss Hester Vanhomrigh which caused him great embarrassment and resulted tragically. Upon his departure from England, the young lady, driven by her love for him, followed him and settled near him in Ireland, and by some secret communication learned of his friendship for Stella, to whom she finally wrote. Having thus incurred Swift's anger, Miss Vanhomrigh died of the grief caused by the rupture of their friendship (1723).

In the year following this unfortunate affair, Swift won the lasting esteem of the Irish people by issuing the Drapier Letters, in which he vigorously opposed the granting of a patent for copper coinage in Ireland. Two years later appeared his Gulliver's Travels (which see), a



GULLIVER WITH THE GIANTS OF BROBDINGNAG

highly amusing satire on human nature. He persisted in trying to lighten the wrongs of the Irish, until, in 1742, as he had long dreaded, he became insane, and continued so until his death.



GULLIVER'S TRAVELS: AMONG THE PEOPLE OF LILLIPUT (SEE PAGES 6962-6964) 6963

SWIFT FAMILY, THE, outstanding in the meat-packing industry in America, planted its roots in the soil of Massachusetts early in the seventeenth century. Originally the family name was Swyft.

Gustavus Franklin Swift (1839-1903) was born on Cape Cod in Massachusettes. Endowed with a native Yankee wit, he saw early the limited life offered him and sought to escape. At the age of sixteen he told his father of his desire to go elsewhere to try his fortune. To keep him at home, his father loaned him \$20. Young Gustavus bought a neighbor's heifer, dressed it himself, and peddled the meat along the sandy Cape Cod



GUSTAVUS F. SWIFT, Sr.

roads. That was the start of the meat-packing business now known as Swift & Company.

He became an expert judge of cattle, then a retail meat dealer, later a wholesaler, and eventually a partner in the Boston firm of Hathaway & Swift. He was thirty-six years old when he reached Chicago in 1875 as a cattle buyer for his firm.

Against terrific odds he fought for and established the shipping of meat in refrigerated cars. marked the beginning of the rise of Swift & Company. Incorporated in 1885 with a capital of \$300,000 and one small plant, the company now operates more than 50 meat-packing plants, 375 branch selling houses, and dairy and poultry plants in areas where the best herds and flocks are found. In addition, oil mills and fertilizer plants also are strategically located so as best to serve their trade. When Gustavus Franklin Swift died he left a prosperous, growing business to his sons, who have carried it on and increased it in size and volume.

Louis Franklin Swift (1861-1937), oldest son of Gustavus, succeeded the latter as president in 1903, serving in that office until 1931 when he became chairman of the board. During his lifetime the business was expanded rapidly, new plants and branch selling houses being added until the company was represented in all parts of the country. In association with his brothers, he worked out a carefully planned program of industrial relations. A non-contributory pension plan was established. Vacations with pay for wage earners, accident and health provisions, and group insurance were among some of the forward steps taken.

Charles H. Swift (1872-), a vice-chairman of the board, is continuing in the business established by his father. He also had much to do with the establishment and growth of Swift & Company's South American business with Europe. This latter business was separated from that of Swift & Company in 1918, an individual corporation being formed. In addition to his duties with Swift & Company, he is president of Compania Swift Internacional. company has plants in South America, Australia, and New Zealand, and most of its products are sold in Great Britain and in various countries of Europe. Charles H. Swift has a deep interest in music, being active in the support of the Chicago Symphony Orchestra.

Gustavus Franklin Swift, Jr. (1881chairman and former president, in addition to his work as head of the corporation, was one of the active

participants in the organization of the Institute of American Meat Packers. brought together more than 300 meat packers from all parts of the country. It has performed notable work in research and in bringing about a clearer understanding of the industry and what it means to the country at large.

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Harold H. Swift (1885-), the youngest son of the founder, and vice-president and director of the company, has shown a



GUSTAVUS F. SWIFT, Jr.

deep interest in social and educational matters. He is president of the board of trustees of the University of Chicago, a director of the United Charities of Chicago, a member of the Rockefeller Foundation, and a member of the General Education Board.

SWIMMING. It is highly desirable that every individual should know how to swim, both for the sake of safety and for the pleasure and benefit that are derived from swimming as a sport.

Preliminary Steps. Unfortunately, fear keeps many persons from learning how to swim. To overcome fear and be entirely independent in water not beyond your depth, it is necessary to know two things: how to breathe and how to stand up when in the water. Breathing is the most important part of swimming, and the following exercises cannot be practiced too often even by the expert.

Stand in water more than waist deep. With arms extended obliquely in front and hands in the water, open the mouth wide. Then, with head slightly forward, drop lower in the water until half the mouth is under water. will be noticed that when the water touches the roof of the mouth or the palate the muscles of the throat contract and do not permit the water to go any farther. You can breathe even with a little water in your mouth. If, however, under such conditions you should suck the air in suddenly you would also draw up some of the water and possibly strangle. The secret lies in opening the mouth wide and letting the air rush in by itself. There is a general tendency, while swimming, to breathe harder and deeper than is really necessary for the amount of exertion involved.

THE STATES OF TH

The next step is to squat in the water, with head forward, until the head is completely submerged. Throughout this process the mouth should remain wide open. Repeat the process and this time open the eyes under water. Your eyes may smart if they are open as you pass the surface of the water, either going down or coming up; so close them at that time. Now take an ordinary breath and duck your head as before, but blow out the air gradually while under water, continuing to exhale until you are above water, at which time you should open your mouth wide for the next breath. Regardless of the amount of water running past your mouth from your head or hair, you can get a breath quickly and easily. If you should try to breathe through your nose a few drops of water would be enough to strangle you. Repeat the "bob"—submerging your head, exhaling, raising your head, and breathing through your mouth—ten or twelve times without stopping. This exercise illustrates the principle of proper breathing while swimming.

Next, with head under water reach for your knees and pull them up to your chest. The first sensation will be that of standing on your head or turning a somersault in the water. This, however, cannot be done except deliberately and with considerable effort, so do not be afraid. You will find it easy to put your feet down when you want to. Just put them down, but keep your hands in the water to balance yourself.

In order to stand, after lying face down in the water, draw up both knees and put your feet down, then raise your head and open your mouth. Be sure to draw up both knees, for if one leg is left extended it will act as a lever on the water and handicap you in standing. After learning to breathe and to stand, you are able to take care of yourself when not beyond your depth.

Crawl Stroke. The most natural and also the most popular stroke is the crawl. After mastering it you are at home in the water and can learn any of the other strokes quickly.

The Kick. The leg stroke, or kick, should be learned first. Float face down, with arms extended and hands together, and thrash the legs up and down. This thrashing should cause you to move slightly. The knees and ankles should be flexible. The major force comes from the thigh, and the kick should be only wide enough for you to feel the knees pass each other. Do not draw up the knees but allow them to bend. If you kick with the leg rigid you will not move, while if you kick with the foot turned up you will move backwards. You can demonstrate to yourself the principle of the kick by standing (out of water) on the toes of one foot and pointing the other down. Your instep will then have the perfect pitch of a propeller blade. Just as the propeller gets its "push" by the pitch of the blade while revolving, so will you get your push in swimming by flipping your feet up and down. While thus standing out of water shake the relaxed leg and notice that the foot revolves as the propeller does. This motion is more pronounced in the water where there is greater pressure.

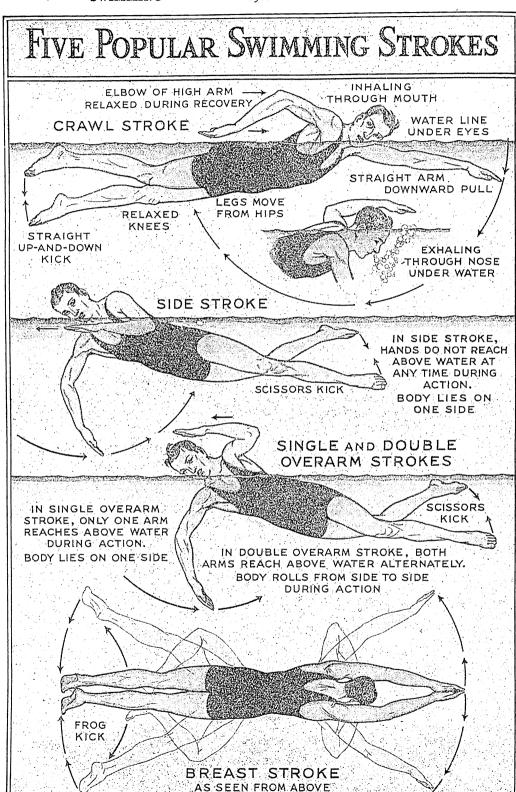
In speed swimming, emphasis is placed on the kick, since it provides a great amount of propulsion; but fatigue is thereby increased. Some swimmers can go as fast with their feet alone as most swimmers can with hands and feet, but never for more than fifteen to twenty yards.

The Arms. The major propulsion in the crawl stroke comes from the arms. The feet help to balance the body and provide as much propulsion as the swimmer feels capable of, according to the distance and his physical makeup. The number of kicks per arm stroke, therefore, depends upon the individual.

In practicing the arm stroke, pull one arm down in a sweeping arc, finishing the stroke with the arm extended at the side and pointed towards the feet. From this point raise the same arm above the water and swing it, relaxed, to the starting point, at the same time beginning the stroke with the other arm. A stroke with one arm should be started before the stroke with the other arm is finished. Thus one arm must swing over the water faster than the opposite arm pulls under the water. Do not reach with either arm farther than you can reach with both arms together. At the beginning of each stroke there should be a slight feeling of coasting on the hand, but at the same time the hand must be going into the stroke. In attempting to feel this coast, be careful not to overreach at the surface of the water, for by so doing you will tire quickly and will not be aided in propelling yourself.

It is necessary to have a slight natural roll to the body in order to swing the arms easily over the water. Most of this roll should be above the hips. The underwater stroke should be timed so that the bottom of the stroke is reached when that side of the body is lowest. When the strokes are properly timed, you should have a feeling of pushing yourself over the water rather than of pulling.

Breathing. In swimming the crawl you breathe on one side. Turn the head to the right at the time the left arm strikes the water. It may be necessary at first to raise the head slightly. Open the mouth and take as much air as you can, then exhale through either the nose or mouth or both. Be sure to exhale all of the air but do it gradually. If you do not exhale all of it, one of two things will happen to handicap and tire you. You may swallow what air is left in your lungs and grab another mouthful, which will soon cause



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ILLUSTRATING THE BACKSTROKE

bloating and will also fill up your throat so that you cannot get a good breath; or you will hold your breath and exhale above water just before inhaling. By so doing you exhale suddenly, and the time that should be used to inhale easily has been used for both exhaling and inhaling. The effect can be seen if you walk around the room a few minutes, take a quick deep breath through your mouth, hold it a short time, then exhale suddenly and gasp another breath. Very soon you will be dizzy.

Other Strokes. Other strokes are comparatively simple after you have mastered the water by learning the crawl. See illustrations on page 6966. In swimming the breast stroke, the subject is pictured in the starting position. The arms move first, as illustrated, counting one, two, three (three is the return to the starting position). On count two of the arm stroke, as illustrated, start the legs, drawing them up, then extending them outward, and sweeping them together, heels first. The arms remain in the starting position until the kick is completed.

The side-stroke kick is somewhat like that of the breast stroke, except that the knee of the upper leg is drawn up and the foot forced out and down, while the lower leg simply swings backward and then forward. The feet come together with a snap, the heel of the top foot touching the instep of the lower foot. The upper arm and upper foot work together, and the arms alternate. The back stroke is the crawl or the breast stroke on the back. E.W.McG.

SWINBURNE, swin' burn, ALGERNON CHARLES (1837-1909), an English poet, born in London. His father was Admiral Charles Henry Swinburne; his mother was Lady Henrietta, a daughter of the third Earl of Ashburnham. He was educated at Eton and at Oxford, where, however, he did not complete his course. In 1860, the year that he left the university, he published The Queen Molher and Rosamond, both modeled on the Elizabethan drama; but

though they were very remarkable for the work of so young a poet, they attracted little attention. In the same year, he made a short continental tour, during which he met Landor, at Florence.

In 1865 Swinburne's genius for the first time became recognized, when Atalanta in Calydon, a tragedy of exceptional metrical beauty, was published. Not long afterward appeared his Poems and Ballads, which brought upon him vigorous censure, because of his revolt against conventional morality. The wonderful melody of the verses could not be denied, however, and it might almost be said that Swinburne, like Byron, became famous in a night. A number of political songs and odes followed, including A Song of Italy, Ode on the Proclamation of the French Republic, Songs before Sunrise, and Songs of Two Nations. In 1881 was completed a trilogy begun in 1865, of which Mary, Queen of Scots, is the subject, the three parts being Chastelard, Bothwell, and Mary Stuart.

Additional Works. Of his other poems may be named the tragedy *Erechtheus*; a second and a third collection of *Poems and Ballads*; the odes addressed to Victor Hugo; *Tristram of Lyonesse*; A Century of Roundels; the tragedies Locrine and Rosamund, Queen of the Lombards; The Tale of Balin; and Astrophel and Other Poems.

SWINE. See Hog.

SWINTON, WILLIAM (1833-1892), a Scottish-American educator, and author of widely used textbooks, was born at Salton, in Scotland. When he was ten years old, he emigrated with his parents to America, and was educated at Knox College, Toronto, and at Amherst College, Mass. He taught at girls' schools in North Carolina and New York, and in 1858 became a member of the staff of the New York Times. During the War of Secession, he was with the Army of the Potomac as correspondent.

In 1869 Swinton was appointed professor of belles-lettres in the University of California, but five years later resigned and devoted himself to the preparation of textbooks. His spelling and language books, histories, and geographies were more widely used than almost any other books of his day, and he was awarded various honors for them.

Other Works. He wrote Rambles among Words, Campaigns of the Army of the Potomac, and The Twelve Decisive Battles of the War, and edited Masterpieces of English Literature.

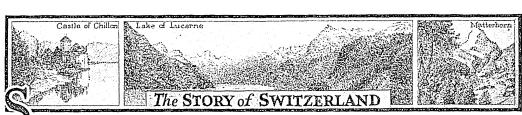
SWISS CHARD. See CHARD.

SWISS GUARDS, a famous body of Swiss soldiers, organized to protect King Louis XIII of France, in 1616. For over 175 years, the Guards were in service, until annihilated by the infuriated populace during the attack on

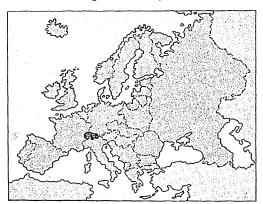
the Tuileries, August 10, 1792. Their courage and devotion to duty is commemorated in the famous "Lion of Lucerne," carved in the face of a rock at Lucerne, Switzerland (see SWITZERLAND, for illustration). This monument is simply and pathetically dedicated "To the Fidelity and Courage of the Helvetians." In 1815 a corps of Swiss Guards was reorganized by Louis XVIII, but they were defeated and dispersed in the Revolution of 1830.

The Pope of Rome maintains a bodyguard of Swiss known as the Papal Guard, composed of picked men possessing the well-known Swiss qualities of courage, intelligence, and fidelity.

SWITCHBOARD. See the article TELE-PHONE, subhead.



WITZERLAND, a land whose serene beauty of majestic mountains, exquisite lakes, and green valleys remains unspoiled by busy cities, by thousands of tourists, or by a sturdy citizenry which wrests its living from these same deep valleys and steep mountain slopes. Not only is Switzerland the "playground of Europe"; it is one of the oldest republics in the world, with one of the most progressive and democratic of governments, and a national



LOCATION MAP

character laboriously welded from three separate groups. As a "buffer state" interposed between three great powers, Switzerland serves as a factor for peace in Europe. A Swiss city—Geneva—was selected in 1919 as the seat of the League of Nations, but in 1940 it became necessary to move most of the League's offices and activities to North America.

Though it encompasses some of the loftiest

peaks of Europe, Switzerland has an area of but 15,944 square miles, which is less than one fourth the area of the New England states, or about half that of Maine. It has no seacoasts, being entirely surrounded by other countries. The Rhine and the Lake of Constance separate it from Germany, on the north; Germany and Liechtenstein lie on the east; Italy and Lake Geneva on the south; and France on the west.

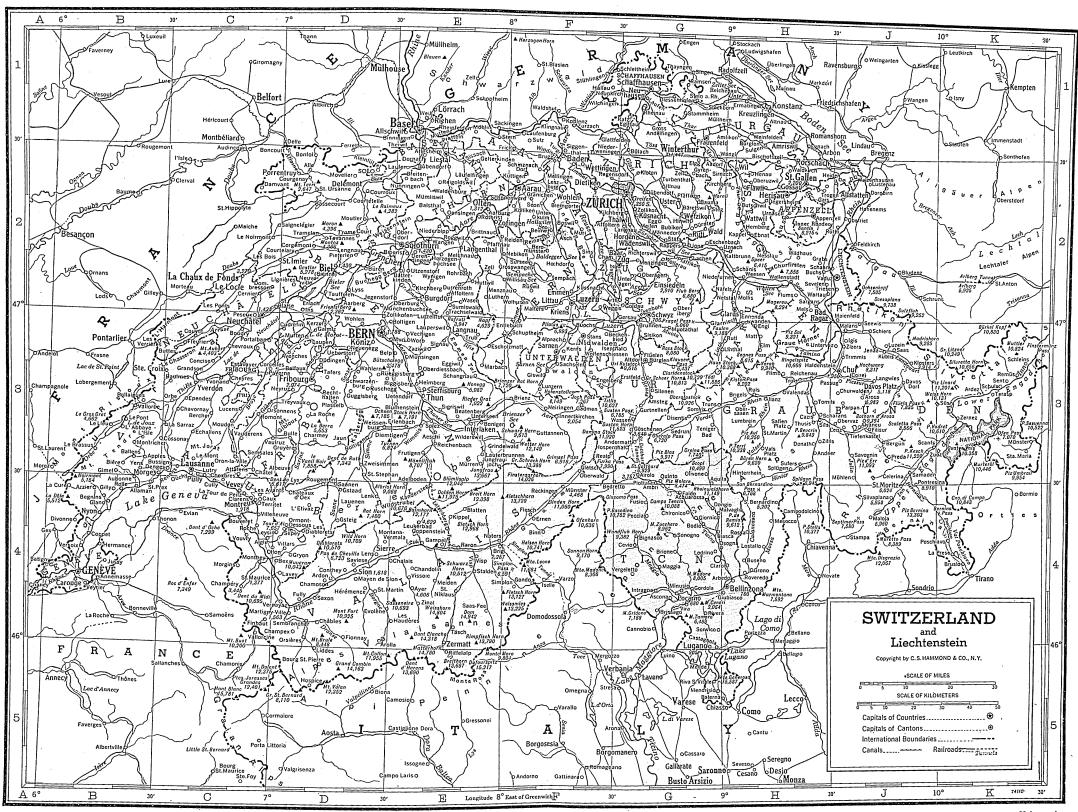
People. In the racial characteristics of its people, Switzerland reveals two sharply contrasting strains—the Latin and the Teutonic -numbering in the 1941 census 4,260,719. The Teutons form a preponderance of the population; the German language is spoken by the majority of inhabitants in seventeen of the twenty-two cantons, those of Central, Northern, and Eastern Switzerland. French and Italians constitute the Latin population. French people predominate, and their language is used in Geneva, Neuchâtel, Vaud, Fribourg, part of Valais, and the Bernese Jura; Italian is the language of the canton of Tessin (Ticino). The historical dialect of Romansch is still spoken by a small group (in the canton of Grisons), and its use is being revived.

Naturally, this old amalgamation of races, as well as the great variations in the nature of the surface of the land itself, would not tend to make a wholly united people with similar national characteristics. Switzerland has nominally twenty-two states, or cantons, about 3,000 communes, and 192 districts, which consist of groups of communes, each with its own local life and customs and independent claims.

In spite of this diversity, however, there is a distinct Swiss character. In it are the en-

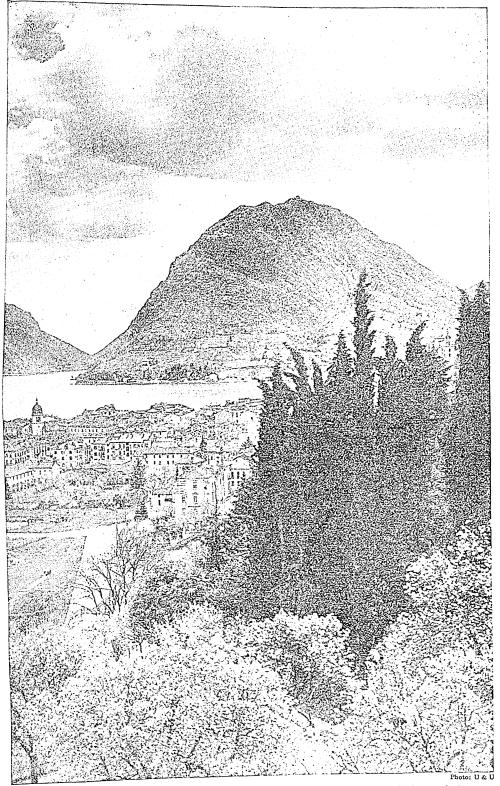
SWITZERLAND

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Aarberg, 1,815 D 2 Aarburg, 2,911 E 2	Bönigen, 1,513 E 3	Einsiedeln, 8,421	Hospenthal, 300
Aare (river)F 3	Boswil, 1,410. F 2 Boudry, 2,501. C 3 Breitenbach, 1,181. E 2 Bremgarten, 3,179. F 2	Elgg, 1,951	Huttwil, 4,376 E 2
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Basset-Land (canton), 94,400. E 2 Bassel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. D 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. C 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Begnins, 684. B 4 Beinwil, 2,097. F 2 Belfaux, 834. D 3 Bellinzona, *10,930. H 4 Belp, 3,581. C 3	Claro, 875. H 4 Concise, 644	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen, 2,815. F 1 Laufen-Uhwiesen, 782 G 1 Laupen, 1,304 D 3 Lauperswil, 2,793. E 3 Lausanne, *20,078. C 3 Lauterbrunnen, 2,800. E 3 Le Lieu, 917. B 3 Le Locle, *11,363 C 2 Le Mont, 1,185. C 3 Lengnau, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Tent, 2,242. E 4
Basset-Land (canton), 94,400. E 2 Bassel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. D 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. C 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Begnins, 684. B 4 Beinwil, 2,097. F 2 Belfaux, 834. D 3 Bellinzona, *10,930. H 4 Belp, 3,581. C 3	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Corgémont, 1,168. D 2 Courgenay, 1,441. D 2 Courgenay, 1,441. D 2 Courtelles, 1,365. D 2 Courtételle, 1,361. D 3 Courtét	Glânie (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen-Uhwiesen, 782. G 1 Laufen-Uhwiesen, 782. G 1 Laupen, 1,304. D 3 Lauperswil, 2,793. E 3 Lausanne, *22,078. C 3 Lausterbrunnen, 2,800. E 3 Le Lieu, 917. B 3 Le Locle, *11,363. C 2 Le Mont, 1,185. C 3 Lengnau, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Leuk, 2,242. E 4 Leukerbad, 526. E 4 Leven 3 217. D 4
Basel-Land (canton), 94,400. E 2 Basel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. D 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. C 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Begnins, 684. B 4 Begnins, 684. B 4 Beinwil, 2,097. F 2 Belfaux, 834. D 3 Bellinzona, *10,930. H 4 Belp, 3,581. D 3 Bercher, 384. C 3 Bergün, 647. J 3 Bern (canton), 725,761. D 3 Bern (canton), 725,761. D 3	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Corgémont, 1,168. D 2 Courroux, 1,605. D 2 Court, 1,275. D 2 Court, 1,275. D 2 Courtelley, 1,361. D 2 Courtelle, 1,361. D 2 Courtelle, 1,361. D 2 Courtelle, 1,365. C 3 Cully, 1,096. C 4 Danwant, 244. C 2 Davos Platz, 9,215. J 3 Degersheim, 2,956. H 2 Delémont, 6,585. D 2 Dengres 230. B 3	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen, 2,815. F 1 Laufen-Uhwiesen, 782. G 1 Laupen, 1,304. D 3 Lauperswil, 2,793. E 3 Lausanne, *92,078. C 3 Lauterbrunnen, 2,800. E 3 Le Lieu, 917. B 3 Le Locle, *11,363. C 2 Le Mont, 1,185. C 3 Lengnau, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Leuk, 2,242. E 4 Leukerbad, 526. E 4 Leysin, 3,217. D 4
Bassel-Land (canton), 94,400. Bassel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. D 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. C 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Beinwil, 2,097. F 2 Belfaux, 834. D 3 Belfiaux, 834. D 3 Belfiaux, 834. D 3 Berlinzona, *10,930. H 4 Belp, 3,581. D 3 Bern (canton), 725,761. D 3 Bern (capital), *129,331. D 3 Bern (capital), *129,331. B Bener (Cherland (region), E 3 Bern (capital), *129,331. B Bener (capital), *129,331. B Bener (capital), *129,331. B Bener (capital), *129,331. B Bener (capital), *129,031. B B Bener (capital), *129,031. B B B B B B B B B B B B B B B B B B B	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See) H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Corgémont, 1,168. D 2 Courroux, 1,605. D 2 Court, 1,275. D 2 Courtelle, 1,361. D 2 Courtételle, 1,361. D 3 Couvet, 2,845. C 3 Cully, 1,096. C 4 Damvant, 244. C 2 Davos Platz, 9,215. J 3 Degersheim, 2,996. H 2 Delémont, 6,585. D 2 Denges, 230. B 3 Dout Blacehe (mt.) E 4	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen, 2,815. F 1 Laufen-Uhwiesen, 782. G 1 Laupen, 1,304. D 3 Lauperswil, 2,793. E 3 Lausanne, *92,078. C 3 Lauterbrunnen, 2,800. E 3 Le Lieu, 917. B 3 Le Locle, *11,363. C 2 Le Mont, 1,185. C 3 Lengnau, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Leuk, 2,242. E 4 Leukerbad, 526. E 4 Leysin, 3,217. D 4
Bassel-Land (canton), 94,400. Bassel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. D 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. C 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Beinwil, 2,097. F 2 Belfaux, 834. D 3 Belfiaux, 834. D 3 Belfiaux, 834. D 3 Berlinzona, *10,930. H 4 Belp, 3,581. D 3 Bern (canton), 725,761. D 3 Bern (capital), *129,331. D 3 Bern (capital), *129,331. B Bener (Cherland (region), E 3 Bern (capital), *129,331. B Bener (capital), *129,331. B Bener (capital), *129,331. B Bener (capital), *129,331. B Bener (capital), *129,031. B B Bener (capital), *129,031. B B B B B B B B B B B B B B B B B B B	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Cossonay, 1,073. C 3 Corgémont, 1,168. D 2 Courroux, 1,605. D 2 Court, 1,275. D 2 Courtelary, 1,059. D 2 Courtételle, 1,361. D 2 Courtételle, 1,361. D 2 Courtetelle, 1,361. D 2 Courtetelle, 1,361. D 3 Couvet, 2,845. C 3 Cully, 1,096. C 4 Damvant, 244. C 2 Davos Platz, 9,215. J 3 Degersheim, 2,956. H 2 Delémont, 6,585. D 2 Denges, 230. B 3 Dent Blanche (mt.) E 4 Dent de Ruth (mt.) D 3	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen-Uhwiesen, 782. G 1 Laufen-Uhwiesen, 782. G 1 Laupen, 1,304. D 3 Lauperswil, 2,793. E 3 Lausanne, *22,078. C 3 Lauterbrunnen, 2,800. E 3 Le Lieu, 917. B 3 Le Locle, *11,363. C 2 Le Mont, 1,185. C 3 Lengnau, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Leuk, 2,242. E 4 Leukerbad, 526. E 4 Leysin, 3,217. D 4 Liddes, 825. D 5 Liestal, 7,216. E 2 Linth (river). G 2
Bassel-Land (canton), 94,400. E 2 Basel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. D 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. C 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Begnins, 684. B 4 Beinwil, 2,097. F 2 Bellaux, 834. D 3 Bellinzona, *10,930. H 4 Belp, 3,581. D 3 Bercher, 384. C 3 Bergün, 647. J 3 Bern (canton), 725,761. D 3 Bern (capital), *129,331. D 3 Bern (capital), *129,331. D 3 Bennen Oberland (region). E 3 Bennina, Piz (mt.). J 4	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See) H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Corgémont, 1,168. D 2 Courgenay, 1,441. D 2 Courroux, 1,605. D 2 Courtételle, 1,361. D 2 Courtételle, 1,365. C 3 Cully, 1,096. C 4 Damvant, 244. C 2 Davos Platz, 9,215. J 3 Degersheim, 2,956. H 2 Delémont, 6,585. D 2 Delémont, 6,585. D 2 Delémont, 6,585. D 3 Det de Guth (mt.) D 3 Derendingen, 3,744. E 2 Disblorets Les	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen-Uhwiesen, 782. G 1 Laufen-Uhwiesen, 782. G 1 Laupen, 1,304. D 3 Lauperswil, 2,793. E 3 Lausanne, *22,078. C 3 Lauterbrunnen, 2,800. E 3 Le Lieu, 917. B 3 Le Locle, *11,363. C 2 Le Mont, 1,185. C 3 Lengnau, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Leuk, 2,242. E 4 Leukerbad, 526. E 4 Leysin, 3,217. D 4 Liddes, 825. D 5 Liestal, 7,216. E 2 Linth (river). G 2
Basel-Land (canton), 94,400. E 2 Basel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. D 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. C 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Begnins, 684. B 4 Begnins, 684. B 4 Begnins, 684. B 4 Beinwil, 2,097. F 2 Belfaux, 834. D 3 Bellinzona, *10,930. H 4 Belp, 3,581. D 3 Berr (canton), 725,761. D 3 Berr (canton), 725,761. D 3 Bern (canton), 725,761. D 3 Bern (canton), 725,761. D 3 Bern (canton), 725,761. D 3 Bernia, Piz (mt.). L 4 Beromünster, 1,300. F 2 Bers, 4,222. D 4	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Cossonay, 1,073. C 3 Corgémont, 1,168. D 2 Courroux, 1,605. D 2 Court, 1,275. D 2 Courtéalle, 1,361. D 2 Courtéalle, 1,361. D 2 Courtéalle, 1,366. C 4 Danvant, 244. C 2 Davos Platz, 9,215. J 3 Degersheim, 2,956. H 2 Deiémont, 6,585. D 2 Denges, 230. B 3 Dent Blanche (mt.) E 4 Dent de Ruth (mt.) B 3 Derendingen, 3,744. E 2 Diablerets, Les. D 4	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen-Uhwiesen, 782. G 1 Laufen-Uhwiesen, 782. G 1 Laupen, 1,304. D 3 Lauperswil, 2,793. E 3 Lausanne, *22,078. C 3 Lauterbrunnen, 2,800. E 3 Le Lieu, 917. B 3 Le Locle, *11,363. C 2 Le Mont, 1,185. C 3 Lengnau, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Leuk, 2,242. E 4 Leukerbad, 526. E 4 Leysin, 3,217. D 4 Liddes, 825. D 5 Liestal, 7,216. E 2 Linth (river). G 2
Basel-Land (canton), 94,400. Basel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. B 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. G 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Beinwil, 2,097. F 2 Belfaux, 834. B 4 Beinwil, 2,097. F 2 Belfaux, 834. D 3 Bellinzona, *10,930. H 4 Belp, 3,581. B 3 Bergin, 647. B 3 Bern (canton), 725,761. B 4 Bernina, Piz (mt.). J 4 Beromünster, 1,300. F 2 Bex, 4,222. Bex, 4,222. Bex, 4,222. B 4 Biasca, 2,618. F 4	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Corgémont, 1,168. D 2 Courgenay, 1,441. D 2 Courroux, 1,605. D 2 Court, 1,275. D 2 Courtételle, 1,361. D 3 Courtételle,	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen-Uhwiesen, 782. G 1 Laufen-Uhwiesen, 782. G 1 Laupen, 1,304. D 3 Lauperswil, 2,793. E 3 Lausanne, *22,078. C 3 Lauterbrunnen, 2,800. E 3 Le Lieu, 917. B 3 Le Locle, *11,363. C 2 Le Mont, 1,185. C 3 Lengnau, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Leuk, 2,242. E 4 Leukerbad, 526. E 4 Leysin, 3,217. D 4 Liddes, 825. D 5 Liestal, 7,216. E 2 Linth (river). G 2
Basel-Land (canton), 94,400. Basel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. B 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. G 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Beinwil, 2,097. F 2 Belfaux, 834. B 4 Beinwil, 2,097. F 2 Belfaux, 834. D 3 Bellinzona, *10,930. H 4 Belp, 3,581. B 3 Bergin, 647. B 3 Bern (canton), 725,761. B 4 Bernina, Piz (mt.). J 4 Beromünster, 1,300. F 2 Bex, 4,222. Bex, 4,222. Bex, 4,222. B 4 Biasca, 2,618. F 4	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Cossonay, 1,073. C 3 Corgémont, 1,168. D 2 Courroux, 1,605. D 2 Courroux, 1,605. D 2 Court, 1,275. D 2 Court, 1,275. D 2 Courtételle, 1,361. D 2 Courtételle, 1,361. D 2 Courtételle, 1,361. D 2 Courtellary, 1,059. D 2 Courtételle, 1,361. D 2 Courtételle, 1,361. D 3 Couvet, 2,845. C 3 Cully, 1,096. C 4 Damvant, 244. C 2 Davos Platz, 9,215. J 3 Degersheim, 2,956. H 2 Delémont, 6,585. D 2 Denges, 230. B 3 Dent Blanche (mt.). E 4 Dent de Ruth (mt.). D 3 Derendingen, 3,744. E 2 Diablerets, Les. D 4 Diemtigen, 1,956. E 3 Diessenhofen, 1,848. G 1 Dietision, 6,121. F 2	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen-Uhwiesen, 782. G 1 Laufen-Uhwiesen, 782. G 1 Laupen, 1,304. D 3 Lauperswil, 2,793. E 3 Lausanne, *22,078. C 3 Lausterbrunnen, 2,800. E 3 Le Lieu, 917. B 3 Le Locle, *11,363. C 2 Le Mont, 1,185. C 3 Lengnau, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Leuk, 2,242. E 4 Leukerbad, 526. E 4 Leysin, 3,217. D 4 Liddes, 825. D 5 Liestal, 7,216. E 2 Linth (river). G 3 Littau, 5,136. F 2 Locarno, 6,804. G 4 Lodtino, 640. G 4 Lostallo, 385. G 4
Basel-Land (canton), 94,400. Basel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. B 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. G 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Beinwil, 2,097. F 2 Belfaux, 834. B 4 Beinwil, 2,097. F 2 Belfaux, 834. D 3 Bellinzona, *10,930. H 4 Belp, 3,581. B 3 Bergin, 647. B 3 Bern (canton), 725,761. B 4 Bernina, Piz (mt.). J 4 Beromünster, 1,300. F 2 Bex, 4,222. Bex, 4,222. Bex, 4,222. B 4 Biasca, 2,618. F 4	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Cossonay, 1,073. C 3 Corgémont, 1,168. D 2 Courroux, 1,605. D 2 Courroux, 1,605. D 2 Court, 1,275. D 2 Court, 1,275. D 2 Courtételle, 1,361. D 2 Courtételle, 1,361. D 2 Courtételle, 1,361. D 2 Courtellary, 1,059. D 2 Courtételle, 1,361. D 2 Courtételle, 1,361. D 3 Couvet, 2,845. C 3 Cully, 1,096. C 4 Damvant, 244. C 2 Davos Platz, 9,215. J 3 Degersheim, 2,956. H 2 Delémont, 6,585. D 2 Denges, 230. B 3 Dent Blanche (mt.). E 4 Dent de Ruth (mt.). D 3 Derendingen, 3,744. E 2 Diablerets, Les. D 4 Diemtigen, 1,956. E 3 Diessenhofen, 1,848. G 1 Dietision, 6,121. F 2	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen-Uhwiesen, 782. G 1 Laufen-Uhwiesen, 782. G 1 Laupen, 1,304. D 3 Lauperswil, 2,793. E 3 Lausanne, *22,078. C 3 Lausterbrunnen, 2,800. E 3 Le Lieu, 917. B 3 Le Locle, *11,363. C 2 Le Mont, 1,185. C 3 Lengnau, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Leuk, 2,242. E 4 Leukerbad, 526. E 4 Leysin, 3,217. D 4 Liddes, 825. D 5 Liestal, 7,216. E 2 Linth (river). G 3 Littau, 5,136. F 2 Locarno, 6,804. G 4 Lodtino, 640. G 4 Lostallo, 385. G 4
Basel-Land (canton), 94,400. E 2 Basel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. D 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. C 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Begnins, 684. B 4 Begnins, 684. B 5 Begnins, 684. B 4 Begnins, 684. B 4 Beinwil, 2,097. F 2 Belfaux, 834. D 3 Bellinzona, *10,930. H 4 Belp, 3,581. D 3 Bercher, 384. C 3 Bercher, 384. C 3 Bergin, 647. J 3 Bern (canton), 725,761. D 3 Bern (canton), 725,761. D 3 Bern (capital), *129,331. D 3 Bern (capital), *129,331. D 3 Bern (capital), *129,331. D 4 Bissa, 2,618. H 4 Biberist, 4,748. E 2 Biel, *40,850. D 2 Bieler See (lake). D 2 Biere, 1,162. G 4	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Cossonay, 1,073. C 3 Corgémont, 1,168. D 2 Courroux, 1,605. D 2 Courtelary, 1,059. D 2 Courtelary, 1,059. D 2 Courtelary, 1,059. D 2 Courtelary, 1,059. C 3 Colly, 1,096. C 4 Danvant, 244. C 2 Davos Platz, 9,215. J 3 Degersheim, 2,956. H 2 Deimont, 6,585. D 2 Denges, 230. B 3 Dent Blanche (mt.) E 4 Dent de Ruth (mt.) B 3 Derendingen, 3,744. E 2 Diablerets, Les. D 4 Diemtigen, 1,956. E 3 Diessenhofen, 1,848. G 1 Dietikon, 6,121. F 2 Disentis, 2,158. G 3 Dolden Horn (mt.) E 4	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen-Uhwiesen, 782. G 1 Laufen-Uhwiesen, 782. G 1 Laupen, 1,304. D 3 Lauperswil, 2,793. E 3 Lausanne, *22,078. C 3 Lausterbrunnen, 2,800. E 3 Le Lieu, 917. B 3 Le Locle, *11,363. C 2 Le Mont, 1,185. C 3 Lengnau, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Leuk, 2,242. E 4 Leukerbad, 526. E 4 Leysin, 3,217. D 4 Liddes, 825. D 5 Liestal, 7,216. E 2 Linth (river). G 3 Littau, 5,136. F 2 Locarno, 6,804. G 4 Lodtino, 640. G 4 Lostallo, 385. G 4
Basel-Land (canton), 94,400. E 2 Basel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. D 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. C 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Begnins, 684. B 4 Begnins, 684. B 5 Begnins, 684. B 4 Begnins, 684. B 4 Beinwil, 2,097. F 2 Belfaux, 834. D 3 Bellinzona, *10,930. H 4 Belp, 3,581. D 3 Bercher, 384. C 3 Bercher, 384. C 3 Bergin, 647. J 3 Bern (canton), 725,761. D 3 Bern (canton), 725,761. D 3 Bern (capital), *129,331. D 3 Bern (capital), *129,331. D 3 Bern (capital), *129,331. D 4 Bissa, 2,618. H 4 Biberist, 4,748. E 2 Biel, *40,850. D 2 Bieler See (lake). D 2 Biere, 1,162. G 4	Claro, 875. H 4 Concise, 644 C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Corgémont, 1,168. D 2 Courgenay, 1,441. D 2 Courroux, 1,605. D 2 Court, 1,275. D 2 Courtételle, 1,361. D 2 Courtelle, 1,365. C 3 Cully, 1,096. C 4 Damvant, 244. C 2 Dawos Platz, 9,215. J 3 Degersheim, 2,956. H 2 Delémont, 6,585. D 2 Denges, 230. B 3 Dent de Ruth (mt.) D 3 Derendingen, 3,744. E 2 Disblerets, Les. D 4 Diemtigen, 1,956. E 3 Diessenhofen, 1,848. G 1 Dietikon, 6,121. F 2 Disentis, 2,158. G 3 Dolden Horn (mt.) E 4 Dombresson, 931. C 2	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen, 2,815. T E Laufen-Uhwiesen, 782 G 1 Laupen, 1,304 D 3 Lauperswil, 2,793. E 3 Lausanne, *92,078. C 3 Lauterbrunnen, 2,800. E 3 Le Lieu, 9,17. B 5 Le Locle, *11,363. C 2 Le Mont, 1,185. C 3 Lenganu, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Leuk, 2,242. E 4 Leysin, 3,217. D 4 Liddes, 825. D 5 Liestal, 7,216. E 2 Linth (river). G 3 Linthal, 1,694. H 3 Littau, 5,136. F 2 Locarno, 6,804. G 4 Lodrino, 640. G 4 Lostallo, 385. H 4 Lucens, 1,505. C 3 Lugano, *17,000. Lave. H 5
Basel-Land (canton), 94,400. Basel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. D 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. C 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Begnins, 684. B 4 Beinwil, 2,097. F 2 Bellaux, 834. D 3 Bellinzona, *10,930. H 4 Belp, 3,581. D 3 Berncenden, 384. C 3 Bergin, 647. J 4 Beromina, Piz (mt.). Bern (canton), 725,761. D 3 Bern (canton), 725,761. Bern (canton), 725,761. Bern (canton), F 2 Bex, 4,222. Bex, 4,222. Bex, 4,222. Bex, 4,222. Bex, 4,222. Biers, 4,428. Bierse, 4,428. Bierse, 4,428. Bierse, 4,6850. Bierse, 4,6850. Bierse, 1,162. Bienso, 151. G 4 Bien, 1,162. B 3 Bignasco, 151. E 1 Bassec, 1714. E 1 Bassec, 151. Bass	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Cossonay, 1,073. C 3 Corgémont, 1,168. D 2 Courroux, 1,605. D 2 Court, 1,275. D 2 Courtéalle, 1,361. D 2 Courtéelle, 1,361. D 2 Courtéelle, 1,366. C 4 Danvant, 244. C 2 Davos Platz, 9,215. J 3 Degersheim, 2,956. H 2 Demont, 6,585. D 2 Denges, 230. B 3 Dent Blanche (mt.). E 4 Dent de Ruth (mt.). D 3 Derendingen, 3,744. E 2 Diablerets, Les. D 4 Diemtigen, 1,956. E 3 Diessenhofen, 1,848. G 1 Diettikon, 6,121. F 2 Disentis, 2,158. G 3 Dolden Horn (mt.). E 4 Domath, 1,413. C 2 Donath, 141. C 3	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen, 2,815. T E Laufen-Uhwiesen, 782 G 1 Laupen, 1,304 D 3 Lauperswil, 2,793. E 3 Lausanne, *92,078. C 3 Lauterbrunnen, 2,800. E 3 Le Lieu, 9,17. B 5 Le Locle, *11,363. C 2 Le Mont, 1,185. C 3 Lenganu, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Leuk, 2,242. E 4 Leysin, 3,217. D 4 Liddes, 825. D 5 Liestal, 7,216. E 2 Linth (river). G 3 Linthal, 1,694. H 3 Littau, 5,136. F 2 Locarno, 6,804. G 4 Lodrino, 640. G 4 Lostallo, 385. H 4 Lucens, 1,505. C 3 Lugano, *17,000. Lave. H 5
Basel-Land (canton), 94,400. Basel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. D 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. C 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Beininzona, *10,930. H 4 Belpias, 584. B 4 Beinwil, 2,097. F 2 Belfaux, 834. D 3 Belfaux, 834. D 3 Berlinzona, *10,930. H 4 Belp, 3,581. D 3 Berner, 384. C 3 Bergin, 647. Berner, 384. C 3 Berner (capital), *129,331. D 3 Bern (capital), *129,331. D 3 Berner (borland (region). Berner Oberland (region). Berner Oberland (region). Berner, 4,22. D 4 Biasca, 2,618. H 4 Biberist, 4,748. Biberist, 4,748. E 2 Bieler See (lake). D 2 Biere, 1,162. B 3 Bignasco, 151. G 4 Binningen, 6,714. E 1 Binningen, 6,714. E 1 Binningen, 6,714.	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Cossonay, 1,073. C 3 Corgémont, 1,168. D 2 Courroux, 1,605. D 2 Court, 1,275. D 2 Courtéalle, 1,361. D 2 Courtéelle, 1,361. D 2 Courtéelle, 1,366. C 4 Danvant, 244. C 2 Davos Platz, 9,215. J 3 Degersheim, 2,956. H 2 Demont, 6,585. D 2 Denges, 230. B 3 Dent Blanche (mt.). E 4 Dent de Ruth (mt.). D 3 Derendingen, 3,744. E 2 Diablerets, Les. D 4 Diemtigen, 1,956. E 3 Diessenhofen, 1,848. G 1 Diettikon, 6,121. F 2 Disentis, 2,158. G 3 Dolden Horn (mt.). E 4 Domath, 1,413. C 2 Donath, 141. C 3	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen, 2,815. T E Laufen-Uhwiesen, 782 G 1 Laupen, 1,304 D 3 Lauperswil, 2,793. E 3 Lausanne, *92,078. C 3 Lauterbrunnen, 2,800. E 3 Le Lieu, 9,17. B 5 Le Locle, *11,363. C 2 Le Mont, 1,185. C 3 Lenganu, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Leuk, 2,242. E 4 Leysin, 3,217. D 4 Liddes, 825. D 5 Liestal, 7,216. E 2 Linth (river). G 3 Linthal, 1,694. H 3 Littau, 5,136. F 2 Locarno, 6,804. G 4 Lodrino, 640. G 4 Lostallo, 385. H 4 Lucens, 1,505. C 3 Lugano, *17,000. Lave. H 5
Basel-Land (canton), 94,400. Basel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. B 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. G 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Beinwil, 2,097. F 2 Belfaux, 834. D 3 Bellinzona, *10,930. H 4 Belp, 3,581. D 3 Bern (canton), 725,761. B Bern (canton), 725,761. B Bern (canton), 725,761. B Bern (capital), *129,331. B Bern (capital), *129,331. B Bernina, Piz (mt.). J 4 Beromünster, 1,300. F 2 Bex, 4,222. B 4 Biberist, 4,748. B 2 Biel, *40,850. D 2 Bieler See (lake). D 2 Bieler See (lake). D 2 Bieler, 1,162. B 3 Bignasco, 151. G 4 Binningen, 6,714. E 1 Bischofzell, 3,007. H 1	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Cossonay, 1,073. C 3 Corgémont, 1,168. D 2 Courroux, 1,605. D 2 Court, 1,275. D 2 Courtéalle, 1,361. D 2 Courtéelle, 1,361. D 2 Courtéelle, 1,366. C 4 Danvant, 244. C 2 Davos Platz, 9,215. J 3 Degersheim, 2,956. H 2 Demont, 6,585. D 2 Denges, 230. B 3 Dent Blanche (mt.). E 4 Dent de Ruth (mt.). D 3 Derendingen, 3,744. E 2 Diablerets, Les. D 4 Diemtigen, 1,956. E 3 Diessenhofen, 1,848. G 1 Diettikon, 6,121. F 2 Disentis, 2,158. G 3 Dolden Horn (mt.). E 4 Domath, 1,413. C 2 Donath, 141. C 3	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen, 2,815. T E Laufen-Uhwiesen, 782 G 1 Laupen, 1,304 D 3 Lauperswil, 2,793. E 3 Lausanne, *20,078. C 3 Lauterbrunnen, 2,800. E 3 Le Lieu, 9,17. B 5 Le Locle, *11,363. C 2 Le Mont, 1,185. C 3 Lenganu, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Leuk, 2,242. E 4 Leysin, 3,217. D 4 Liddes, 825. D 5 Liestal, 7,216. E 2 Linth (river). G 3 Linthal, 1,694. H 3 Littau, 5,136. F 2 Locarno, 6,804. G 4 Lodrino, 640. G 4 Lostallo, 385. H 4 Lucens, 1,505. C 3 Lugano, *17,000. Lave. H 5
Basel-Land (canton), 94,400. Basel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. D 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. C 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Begnins, 684. B 4 Beinwil, 2,097. F 2 Bellaux, 834. D 3 Bedlinzona, *10,930. H 4 Belp, 3,581. D 3 Berncent, 384. C 3 Bergin, 647. J 3 Bern (canton), 725,761. D 3 Bern (canton), 725,761. D 3 Bern (canton), 725,761. Bernina, Piz (mt.). J 4 Beromünster, 1,300. F 2 Bex, 4,222. Bex, 4,223. Bernina, Piz (mt.). Bisca, 2,618. Bisca, 2,618. Bisca, 2,618. Bisca, 2,618. Bisca, 2,618. Bisca, 1,162. Bischoizell, 3,007. Birlasten, 371. Bischoizell, 3,007. Bitter, 1,162. Bitter, 1,162. Bischoizell, 3,007. Bitter, 1,162. Bischoizell, 3,007. Bitter, 1,162. Bitte	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Cossonay, 1,073. C 3 Corgémont, 1,168. D 2 Courroux, 1,605. D 2 Court, 1,275. D 2 Courtéalle, 1,361. D 2 Courtéelle, 1,361. D 2 Courtéelle, 1,366. C 4 Danvant, 244. C 2 Davos Platz, 9,215. J 3 Degersheim, 2,956. H 2 Demont, 6,585. D 2 Denges, 230. B 3 Dent Blanche (mt.). E 4 Dent de Ruth (mt.). D 3 Derendingen, 3,744. E 2 Diablerets, Les. D 4 Diemtigen, 1,956. E 3 Diessenhofen, 1,848. G 1 Diettikon, 6,121. F 2 Disentis, 2,158. G 3 Dolden Horn (mt.). E 4 Domath, 1,413. C 2 Donath, 141. C 3	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen, 2,815. T E Laufen-Uhwiesen, 782 G 1 Laupen, 1,304 D 3 Lauperswil, 2,793. E 3 Lausanne, *20,078. C 3 Lauterbrunnen, 2,800. E 3 Le Lieu, 9,17. B 5 Le Locle, *11,363. C 2 Le Mont, 1,185. C 3 Lenganu, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Leuk, 2,242. E 4 Leysin, 3,217. D 4 Liddes, 825. D 5 Liestal, 7,216. E 2 Linth (river). G 3 Linthal, 1,694. H 3 Littau, 5,136. F 2 Locarno, 6,804. G 4 Lodrino, 640. G 4 Lostallo, 385. H 4 Lucens, 1,505. C 3 Lugano, *17,000. Lave. H 5
Basel-Land (canton), 94,400. Basel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. D 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. C 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Begnins, 684. B 4 Beinwil, 2,097. F 2 Belfaux, 834. D 3 Bedlinzona, *10,930. H 4 Belp, 3,581. D 3 Bern (canton), 725,761. D 3 Bern (canton), 725,761. D 3 Bern (canton), 725,761. Bern (canton), 725,761. Bern (canton), F 2 Bes, 4,222. D 4 Biberist, 4,748. E 2 Biel, *40,850. D 2 Bière, 1,162. Bien See (lake). D 2 Bière, 1,162. Biscan, 249. E 4 Binningen, 6,714. Bischoizell, 3,007. H 1 Blatten, 377. E 4 Blumenstein, 968. B 3 Bliminiselp (mt.). E 3 Bliminiselp (mt.). E 3 Bliminiselp (mt.).	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Cossonay, 1,073. C 3 Corgément, 1,168. D 2 Courroux, 1,605. D 2 Court, 1,275. D 2 Courtelary, 1,059. D 2 Courtételle, 1,361. D 3 Couyet, 2,845. C 3 Cully, 1,096. C 4 Damvant, 244. C 2 Davos Platz, 9,215. J 3 Degresheim, 2,956. H 2 Deimont, 6,585. D 2 Denges, 230. m. B 3 Dent Blanche (mt.). D 3 Dent Blanche (mt.). E 4 Dent de Ruth (mt.). D 3 Dientelle, 1,361. G 3 Diessenhofen, 1,848. G 1 Diettikon, 6,121. F 2 Disentis, 2,158. G 3 Dicessenhofen, 1,848. G 1 Diettikon, 6,121. F 2 Donath, 141. H 3 Dongio, 442. G 4 Donnach, 3,060. E 2 Dübendorff, 5,105. G 2 Düdingen, 3,615. D 3 Dürnten, 3,610. F 2	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen, 2,815. T E Laufen-Uhwiesen, 782 G 1 Laupen, 1,304 D 3 Lauperswil, 2,793. E 3 Lausanne, *20,078. C 3 Lauterbrunnen, 2,800. E 3 Le Lieu, 9,17. B 5 Le Locle, *11,363. C 2 Le Mont, 1,185. C 3 Lenganu, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Leuk, 2,242. E 4 Leysin, 3,217. D 4 Liddes, 825. D 5 Liestal, 7,216. E 2 Linth (river). G 3 Linthal, 1,694. H 3 Littau, 5,136. F 2 Locarno, 6,804. G 4 Lodrino, 640. G 4 Lostallo, 385. H 4 Lucens, 1,505. C 3 Lugano, *17,000. Lave. H 5
Basel-Land (canton), 94,400. Basel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. B 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. G 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Beenins, 684. B 4 Beinwil, 2,097. F 2 Belfaux, 834. D 3 Bellinzona, *10,930. H 4 Belp, 3,581. D 3 Bernied, 1,362. B 4 Bein (canton), 725,761. B 3 Bern (canton), 725,761. B 4 Bern (canton), 725,761. B 5 Bern (canton), 725,761. B 6 Bern (canton), 725,761. B 7 Bernia, Piz (mt.). J 4 Beromünster, 1,300. B 2 Bek, 4,222. B 4 Biberist, 4,748. B 2 Biel, *40,850. B 2 Bieler See (lake). D 2 Bieler See (lake). D 2 Biere, 1,162. B 3 Bignasco, 151. G 4 Binnia, 249. B 1 Bischofzell, 3,007. H 1 Blatten, 377. B 4 Blumenstein, 968. E 3 Blümlisalp (mt.). E 4 Bunningen, 6,714. B 1 Blumenstein, 968. E 3 Blümlisalp (mt.). E 4 Bunningen, 6,714. B 1 Blumenstein, 968. E 3 Blümlisalp (mt.).	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Cossonay, 1,073. C 3 Corgément, 1,168. D 2 Courroux, 1,605. D 2 Court, 1,275. D 2 Courtelary, 1,059. D 2 Courtételle, 1,361. D 3 Couyet, 2,845. C 3 Cully, 1,096. C 4 Damvant, 244. C 2 Davos Platz, 9,215. J 3 Degresheim, 2,956. H 2 Deimont, 6,585. D 2 Denges, 230. m. B 3 Dent Blanche (mt.). D 3 Dent Blanche (mt.). E 4 Dent de Ruth (mt.). D 3 Dientelle, 1,361. G 3 Diessenhofen, 1,848. G 1 Diettikon, 6,121. F 2 Disentis, 2,158. G 3 Dicessenhofen, 1,848. G 1 Diettikon, 6,121. F 2 Donath, 141. H 3 Dongio, 442. G 4 Donnach, 3,060. E 2 Dübendorff, 5,105. G 2 Düdingen, 3,615. D 3 Dürnten, 3,610. F 2	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen, 2,815. T E Laufen-Uhwiesen, 782 G 1 Laupen, 1,304 D 3 Lauperswil, 2,793. E 3 Lausanne, *20,078. C 3 Lauterbrunnen, 2,800. E 3 Le Lieu, 9,17. B 5 Le Locle, *11,363. C 2 Le Mont, 1,185. C 3 Lenganu, 2,376. D 2 Lenk, 1,729. D 4 Le Noirmont, 1,410. C 2 Lenzburg, 4,257. F 2 Lepontine Alps (mts.) G 4 Les Bois, 1,074. C 2 Les Verrières, 1,191. B 3 Leuk, 2,242. E 4 Leysin, 3,217. D 4 Liddes, 825. D 5 Liestal, 7,216. E 2 Linth (river). G 3 Linthal, 1,694. H 3 Littau, 5,136. F 2 Locarno, 6,804. G 4 Lodrino, 640. G 4 Lostallo, 385. H 4 Lucens, 1,505. C 3 Lugano, *17,000. Lave. H 5
Basel-Land (canton), 94,400. Basel-Stadt (canton), 169,223. E 1 Bassecourt, 1,363. D 2 Bätterkinden, 1,537. E 2 Baulmes, 1,008. C 3 Bauma, 2,680. G 2 Beatenberg, 1,206. E 3 Beckenried, 1,822. G 3 Bedretto, 273. G 4 Begnins, 684. B 4 Beinwil, 2,097. F 2 Bellaux, 834. D 3 Bellinzona, *10,930. H 4 Belp, 3,581. D 3 Berncert, 384. C 3 Bergin, 647. J 3 Bern (canton), 725,761. D 3 Bern (canton), 725,761. D 3 Bern (canton), 725,761. Bernina, Piz (mt.). J 4 Beromünster, 1,300. F 2 Bex, 4,222. Bex, 4,223. Bernina, Piz (mt.). Bisca, 2,618. Bisca, 2,618. Bisca, 2,618. Binn, 249. Bier, 1,162. Bischoizell, 3,007. Bilminingen, 6,714. Bischoizell, 3,007. Blumenstein, 968. B 3 Blümlisalp (mt.). Boden Sec (Lake) B C 1,400. Boden Sec (Lake) B C 1,400. B C 1,400. B B B B B B B B B B B B B B B B B B B	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Cossonay, 1,073. C 3 Corgément, 1,168. D 2 Courroux, 1,605. D 2 Court, 1,275. D 2 Courtelary, 1,059. D 2 Courtételle, 1,361. D 3 Couyet, 2,845. C 3 Cully, 1,096. C 4 Damvant, 244. C 2 Davos Platz, 9,215. J 3 Degresheim, 2,956. H 2 Deimont, 6,585. D 2 Denges, 230. m. B 3 Dent Blanche (mt.). D 3 Dent Blanche (mt.). E 4 Dent de Ruth (mt.). D 3 Dientelle, 1,361. G 3 Diessenhofen, 1,848. G 1 Diettikon, 6,121. F 2 Disentis, 2,158. G 3 Dicessenhofen, 1,848. G 1 Diettikon, 6,121. F 2 Donath, 141. H 3 Dongio, 442. G 4 Donnach, 3,060. E 2 Dübendorff, 5,105. G 2 Düdingen, 3,615. D 3 Dürnten, 3,610. F 2	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen, 2,815. D 2 Laufen-Uhwiesen, 782. G 1 Laupen, 1,304. D 3 Lauperswil, 2,793. E 3 Lausanne, *92,078. C 3 Lausanne, *92,078. C 3 Lauterbrunnen, 2,800. E 3 Le Loie, *17. S 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6
Basel-Land (canton), 94,400. Basel-Stadt (canton), 169,223	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Cossonay, 1,073. C 3 Corgément, 1,168. D 2 Courroux, 1,605. D 2 Court, 1,275. D 2 Courtelary, 1,059. D 2 Courtételle, 1,361. D 3 Couyet, 2,845. C 3 Cully, 1,096. C 4 Damvant, 244. C 2 Davos Platz, 9,215. J 3 Degresheim, 2,956. H 2 Deimont, 6,585. D 2 Denges, 230. m. B 3 Dent Blanche (mt.). D 3 Dent Blanche (mt.). E 4 Dent de Ruth (mt.). D 3 Dientelle, 1,361. G 3 Diessenhofen, 1,848. G 1 Diettikon, 6,121. F 2 Disentis, 2,158. G 3 Dicessenhofen, 1,848. G 1 Diettikon, 6,121. F 2 Donath, 141. H 3 Dongio, 442. G 4 Donnach, 3,060. E 2 Dübendorff, 5,105. G 2 Düdingen, 3,615. D 3 Dürnten, 3,610. F 2	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen, 2,815. D 2 Laufen-Uhwiesen, 782. G 1 Laupen, 1,304. D 3 Lauperswil, 2,793. E 3 Lausanne, *92,078. C 3 Lausanne, *92,078. C 3 Lauterbrunnen, 2,800. E 3 Le Loie, *17. S 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6
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Basel-Land (canton), 94,400. Basel-Stadt (canton), 169,223	Claro, 875. H 4 Concise, 644. C 3 Constance, Lake (Boden See). H 1 Conthey, 3,446. D 4 Coppet, 491. B 4 Corcelles, 1,277. C 3 Cossonay, 1,073. C 3 Corgémont, 1,168. D 2 Courroux, 1,605. D 2 Court, 1,275. D 2 Courtéalle, 1,361. D 2 Courtéelle, 1,361. D 2 Courtéelle, 1,366. C 4 Danvant, 244. C 2 Davos Platz, 9,215. J 3 Degersheim, 2,956. H 2 Demont, 6,585. D 2 Denges, 230. B 3 Dent Blanche (mt.). E 4 Dent de Ruth (mt.). D 3 Derendingen, 3,744. E 2 Diablerets, Les. D 4 Diemtigen, 1,956. E 3 Diessenhofen, 1,848. G 1 Diettikon, 6,121. F 2 Disentis, 2,158. G 3 Dolden Horn (mt.). E 4 Domath, 1,413. C 2 Donath, 141. C 3	Glâne (river)	Läufelfingen, 1,008. E 2 Laufen, 2,815. D 2 Laufen, 2,815. D 2 Laufen-Uhwiesen, 782. G 1 Laupen, 1,304. D 3 Lauperswil, 2,793. E 3 Lausanne, *92,078. C 3 Lausanne, *92,078. C 3 Lauterbrunnen, 2,800. E 3 Le Loie, *17. S 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6



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Maggiore, LakeG 4		C f 460 T 2	Turner (mt) D 2
Tituggiore, Educo	Peccia, 206	Scants, 462	Turnen (mt.) D 3 Ueberstorf, 1,636 D 3
Maienfeld, 1,478J 2	Peseux, 3,126	Schaffhausen, *22,400G 1	Ueberstori, 1,030
Malans, 1,239	Pfaffikon, 4,016	Schaffhausen (canton),	Uetendorf, 2,178 E 3
Maloja	Pfäffikon (Schwyz)G 2		Unterägeri, 3,180
Malters 4 013 F 2	Pfaffnau 2.428 E 2	Schangnau, 1.087 E 3	Unterkulm, 1,693F 2
Malvaglia, 1,186	Pieterlen, 1,959	Schänis, 2,100	Unterseen, 3,090E 3 Untervaz, 1,161H 3
Maivagna, 1,100	Pilatus (mt.)F 3	Scharans, 487	Untervaz. 1.161
Männedorf, 3,704 G 2	Plasselb, 525	Schiers 2.185	Uri (canton), 27,359G 3
Mannlifluh (mt.)E 3	Plasselb, 525	- Comers, 2,100	Urirotstock (mt.)G 3
Marbach, 1,439 E 3	Pontresina, 758 J 3	Schinznach-Dori, 922F	TI- "1 2 460 II 2
Martigny-Ville, 3,200D 4	Porrentruy, 6,091 2	Schleins, 632 K 3	Urnäsch, 2,469
Matt, 607	Portalban, 159 C 3 Poschiavo, 3,963 K 4	Schleitheim, 1,474 G 1	Uster, *10,520
Matterhorn (mt.)E 5	Poschiavo, 3.963	Schönenwerd, 3,316E 2	Utzenstori, 2,329 2
Meilen, 5,003 G 2	Pragel Pass	Schuls 1 347 K 3	Uznach, 2,487
Mainingan 2 252 E 2	Pratteln, 5,126 E 1	Schupfheim, 3,659F 3	Valais (canton), 148,589 E 4
Meiringen, 3,253 F 3	Pully, 5,993	Schwanden 2.764 H 3	Valendas, 460
Melchnau, 1,439 E 2	Ouinto. 1.219		Vallorbe, 3,594
Melide, 668	Quinto, 1,219 3	Sinwarzenburg	Vals Platz, 920H 3
Mellingen, 1,482 F 2	Rafruti (mt.) E 3	Schwarz Horn (mt.)E 4	Vals Flatz, 920
Mels, 5,107H 2	Rafz, 1,592	Schwarz Horn (mt.)F 3	Vaud (canton), 342,058C 3
Mendrisio, 4,248 G 5	Raimeux, Le (mt.)D 2	Schwyz 9.436 G 2	Vauderens, 208
Menzingen 2 893 G 2	Ramsen, 1,173	Schwyz (canton), 00.095, G Z	Vaulruz, 761
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Mesocco, 1,146	Raron, 820E 4		Vergeletto, 283G 4
Mesocco, 1,140	Realp, 233 F 3		
Minusio, 2,382		Sempach. 1.226F 2	Vevey, *12,613
Moesa (river)			Veyrier, 1,624
Möhlin, 3,222 E 1	Reckingen, 358 <u>F</u> 4	Sempacher See (lake) 2	Veyrier, 1,024
Mollis, 2,067H 2	Regensdorf, 1,768F 2		Villeneuve, 1,785 C 4
Montana-Vermala, 1,266 E 4	Reichenbach, 2,586 B 3		Vira, 509 G 4
Monthey, 4,909 C 4	Reiden, 2,476 F 2	Sevelen, 2,127	Visp, 2,322 E 4
Montoz (mt.)	Reigoldswil, 1,139E 2		
Montreux, 14,416C 4	Reinach, 4,574 F 2	Siggenthal, 1,643F 1	Vouvry, 1,262
Montricher 654 B 3	Remüs, 579		Wädenswill 0415 G 2
	Renens. 4.561	Sigriswil. 3.754 E 3	Wahlern, 4,582
Morges, 5,821			Wallerin, 4,302
Moron (mt.)	Reuss (river)		Waldenburg, 1,056 E 2
Moudon, 2,340	Rhein (Rhine, river).H 3-E 1	Sils im Domlesch, 590H 3	Waldkirch, 2,407H 2
Moutier, 5,157	Rheinau, 2,168	Silvaplana, 299	Wallen See (lake)H 2
Movelier, 306	Rheineck, 2,493	Simme (river)	Wallenstadt, 3,220H 2
Mühlen, 105	Rheinfelden 3 024 E. 1	Simplon, 463 F 4	Walzenhausen, 2,415J 2
Müllheim, 1,402	Rheinfelden, 3,924 E 1 Rhône (river) D 4	Simplon TunnelF 4	Wangen, 1,430 E 2
Mumicini, 1,402	Dial toward 4 520 C 7	Sion, 9,513	Wangi, 1,233 G 1
Mümliswil-Ramiswil,	Richterswil, 4,530 G 2 Rieder Grat (mt.) E 3	C 2	Wartau, 3,448H 2
2,505E 2		Sirnach, 2,420	Waitau, 5,446
Münchenbuchsee, 2,243 E 2		Sisikon, 446	Wassen, 953
Münsingen, 4,663. E 3 Münster, 476. F 4 Münster, 757. K 3		Sissach, 3,024 <u>E</u> 2	Wattwil, 5,831
Münster, 476 F 4	Riva-S. Vitale, 1,153 G 5		Weesen, 1,077H 2
Münster, 757 K 3	Rivera, 859	Solothurn (canton).	Weggis, 2,049 F 2
Muota (river)		154,854E 2 Somvix, 1,723	Weinfelden, 5,135
Muotathal, 2,363 G 3	Roggwil, 3,018 E 2	Somvix. 1.723	Weisshorn (mt.)E 4
Mudiaina, 2,303 G 3		Sonogno, 160	
Muri, 3,322		Sonvico, 976	Wetterhorn (mt.)F 3
Murten, 2,383			Wettingen, 9.210F 2
Muttenz, 5,943 <u>E</u> 1	Romanshorn, 5,845H 1		
Näfels, 3,159 H 2	Romont, 2,463		
Napf (mt.)	Rorschach, *10,578	Splügen Pass	Wil, 7,620 H 2
Nebikon, 885 F 2	Ross Stock (mt.)G 3	Stäfa. 4.804	Wilchingen, 937 F 1
Nesslau, 1,946 H 2	Rot Horn (mt.)D 4	Stalden, 901 E 4	Wilderswil, 1,641 E 3
Notetal 2 252 H 2	Rothrist, 3,686	Stampa, 417	Wildhaus, 1,150
Netstal, 2,252	Rougemont, 993D 4		Wildstrubel (mt.)E 4
Neuchatel, 723,925	Rougemont, 993	Ctl-l 0 210	Willisau, 2,076F 2
Neuchâtel (canton),	Roveredo, 1,554 H 4	Steckborn, 2,310 G 1 Steffisburg, 7,999 E 3	Willisau, 2,070 E 2
117,971		Steffisburg, 7,999E 3	Wimmis, 1,647 E 3
Neuchâtel, Lac deC 3			Windisch, 3,612 F 2 Winterthur, *58,915 G 1
Neuenegg, 2,368	Rüschegg, 2,062		Winterthur, *58,915 G 1
Neuhausen, 7,373G 1	Ruswil, 4,520 F 2	Stock Horn (mt.)E 3	wonien b. Bern, 2,793D 3
Neunkirch, 1,103F 1	Rüthi, 1,337 J 2	Sufers, 118	Wohlen, 6.053
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Neuveville, 2,433D 2	D., 669 H 3	Sulz, 1,045 F 1	Wolhusan 2 042 F 2
Neyruz, 566	Ruti, 668	Sumiswald, 5,613 E 2	Wolhusen, 2,942F 2
Neyruz, 566	Ruti, 668	Sumiswald, 5,613 E 2 Sursee, 3,880 F 2	Wollerau, 1.816
Neyruz, 566	Ruti, 668	Sumiswald, 5,613 E 2 Sursee, 3,880 F 2 Sis, 295 K 3	Wollerau, 1,816
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Neyruz, 566	Ruti, 668	Sumiswald, 5,613. E 2 Sursee, 3,880. F 2 S is, 295. K 3 Susten Horn (mt.). G 3	Wollerau, 1,816
Neyruz, 566	Ruti, 668. H 3 Saane (river). D 4 Saanen, 4,606. D 4 Saas, 546. J 3 Saas-Fee, 469. E 4 Sacked 2,009 F 3	Sumiswald, 5,613. E 2 Sursee, 3,880. F 2 S is, 295. K 3 Susten Horn (mt.). G 3	Wollerau, 1,816
Neyruz, 566	Ruti, 668. H 3 Saane (river) D 4 Saanen, 4,606. D 4 Saas, 546. J 3 Saas-Fee, 409. E 4 Sachseln, 2,099 F 3 Safien, 441. H 3	Sumiswald, 5,613. E 2 Sursee, 3,880. F 2 S is, 295. K 3 Susten Horn (mt.). G 3	Wollerau, 1,816
Neyruz, 566	Ruti, 668. H 3 Saane (river) D 4 Saanen, 4,606. D 4 Saas, 546. J 3 Saas-Fee, 409. E 4 Sachseln, 2,099 F 3 Safien, 441. H 3	Sumiswald, 5,613. E 2 Sursee, 3,880. F 2 S is, 295. K 3 Susten Horn (mt.). G 3	Wollerau, 1,816
Neyruz, 566	Ruti, 668. H 3 Saane (river). D 4 Saanen, 4,606. D 4 Saas, 546. J 3 Saas-Fee, 469. E 4 Sachseln, 2,099. F 3 Safien, 441. H 3 Saignelégier, 1,340. D 2 St. Report Great (Pass	Sumiswald, 5,613. E 2 Sursee, 3,880. F 2 Sus 255. K 3 Susten Horn (mt.). G 3 Susten Pass. G 3 Tafers, 1,449. D 3 Täsch, 392. E 4 Tauffelen, 1,091. D 2	Wollerau, 1,816. G 2 Worb, 4,619. E 3 Wynigen, 2,331. E 2 Yens, 560. B 3 Yverdon, *10,858. C 3 Yvonand, 1,202. C 3 Zaziwil, 1,156. E 3 Zall 1,707. E 2
Neyruz, 566	Ruti, 668. H 3 Saane (river). D 4 Saanen, 4,606. D 4 Saas, 546. J 3 Saas-Fee, 469. E 4 Sachseln, 2,099. F 3 Saignelégier, 1,340. D 2 St. Bernard, Great (Pass	Sumiswald, 5,613. E 2 Sursee, 3,880 F 2 S 1s, 295 K 3 Susten Horn (mt.). G 3 Susten Pass G 3 Tafers, 1,449 D 3 Täsch, 392 E 4 Tauffelen, 1,091 D 2 Tavannes, 3,448 D 2 Teniger Bad G 3	Wollerau, 1,816. G 2 2 Worb, 4,619. E 3 Wynigen, 2,331. E 2 Yens, 560. B 3 Yverdon, *10,858. C 3 Zoziwil, 1,156. E 3 Zell, 1,707. E 2 Zell 2,642. G 2
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Neyruz, 566	Ruti, 668	Sumiswald, 5,613. E 2 Sursee, 3,880 F 2 Sis, 295. K 3 Susten Horn (mt.). G 3 Susten Pass. G 3 Tafers, 1,449 D 3 Täsch, 392 E 4 Tauffelen, 1,091. D 2 Tavannes, 3,448. D 2 Terniger Bad. G 3 Terri, Mt D 2 Tersin (Ticino, river). G 4	Wollerau, 1,816. G 2 Worb, 4,619. E 3 Wynigen, 2,331. E 2 Yens, 560. B 3 Yverdon, *10,858. C 3 Yvonand, 1,202. C 3 Zaziwil, 1,156. E 3 Zell, 1,707. E 2 Zell, 2,642. G 2 Zermatt, 1,144. E 4 Zernez, 729. K 3 Zillis-Reischen, 273. H 3
Neyruz, 566. D 3 Nidwalden (canton), 17,346. F 3 Niederbipp, 2,675. E 2 Niederurnen, 2,560. H 2 Niederweningen, 736. F 1 Nunningen, 1,101. E 2 Nyon, 5,248. B 4 Oberägeri, 2,252. G 2 Oberalpstock (mt.). G 3 Oberburg, 2,901. E 2 Oberdorf, 954. E 2 Oberdorf, 954. E 2 Oberiberg, 5355. G 2	Ruti, 668. H 3 Saane (river). D 4 Saanen, 4,606. D 4 Saas, 546. J 3 Saas-Fee, 469. E 4 Sachseln, 2,099. F 3 Safien, 441. H 3 Saignelégier, 1,340. D 2 St. Bernard, Great (Passand Hospice). D 5 St. Blaise, 1,618. D 2 St. Callen, *62,360. H 2 St. Gallen, *62,360. H 2 St. Gallen (canton).	Sumiswald, 5,613 E 2 Surisee, 3,880 F 2 S 1s, 295 K 3 Susten Horn (mt.) G 3 Susten Pass G 3 Tafers, 1,449 D 3 Täsch, 392 E 4 Tauffelen, 1,091 D 2 Tavannes, 3,448 D 2 Teniger Bad G 3 Terri, Mt D 2 Tessin (Ticino, river) G 4 Thalwil, 7,941 G 2 Thayannes, 2,255 G 2 Thayannes, 2,255 G 2	Wollerau, 1,816. G 2 Worb, 4,619. E 3 Wynigen, 2,331. E 2 Yens, 560. B 3 Yverdon, *10,858. C 3 Yvonand, 1,202. C 3 Zaziwil, 1,156. E 3 Zell, 1,707. E 2 Zell, 2,642. G 2 Zermatt, 1,144. E 4 Zernez, 729. K 3 Zillis-Reischen, 273. H 3 Zilzers, 1,293. J 3
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Neyruz, 566. D 3 Nidwalden (canton), 17,346. F 3 Niederbipp, 2,675. E 2 Niederurnen, 2,560. H 2 Niederweningen, 736. F 1 Nunningen, 1,101. E 2 Nyon, 5,248. B 4 Oberägeri, 2,252. G 2 Oberalpstock (mt.). G 3 Oberburg, 2,901. E 2 Oberdiessbach, 1,693. E 3 Oberdorf, 954. E 2 Oberdiessbach, 1,693. E 3 Oberdorf, 954. E 2 Obersight, 5,215. J 2 Obersaxen, 715. H 3 Obervaz, 1,391. J 3 Oberwald, 266. F	Ruti, 668	Sumiswald, 5,613. E 2 Sursec, 3,880 F 2 Sis, 295. K 3 Susten Horn (mt.). G 3 Susten Pass. G 3 Tafers, 1,449 D 3 Täsch, 392 E 4 Tauffelen, 1,091. D 2 Tavannes, 3,448. D 2 Teniger Bad. G 3 Terri, Mt D 2 Tersin (Ticino, river). G 4 Thalwil, 7,941. G 2 Thayngen, 2,255. G 1 Thun, *20,208. E 3 Thurgau (canton), 137,705. H 1	Wollerau, 1,816. G 2 Worb, 4,619. E 3 Wynigen, 2,331. E 2 Yens, 560. B 3 Yverdon, *10,858. C 3 Yvonand, 1,202. C 3 Zaziwil, 1,156. E 3 Zell, 1,707. E 2 Zell, 2,642. G 2 Zermatt, 1,144. E 4 Zernez, 729. K 3 Zillis-Reischen, 273. H 3 Zizers, 1,293. J 3 Zizers, 1,293. J 3 Zofingen, 6,467. E 2 Zollikofen, 2,831. D 3 Zollikon, 5,888. G 2 Zum. *12,316. G 2
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ME SANDER BURNER SANDAR SANDAR

Lovely Lugano. A striking camera study of the town and lake, one of the most beautiful spots in Europe.

Mont Bré is in the background. 6969

thusiasm for liberty which won the confederation's freedom from Austria, the practical good sense that enabled the people to work out their progressive government, and the thrift which has made a prosperous nation live in an area with many natural disadvantages. These qualities are inherent in the city-dwellers, in the people of the pastoral districts, and in the

mountain farmers. These latter have continually a severe struggle to gain a livelihood. They have not only the nature of the ground and the long, cold winters to contend with, but are in constant danger from avalanches, which may wipe out whole communities within a few minutes. In many places, earthworks and ridges of stone have been built to divert the direction of the avalanche from the community, should it by chance descend upon them.



In the canton of Bern, in a village of 3,600 people.

The mountains of Switzerland attract sportsmen and travelers from all over the world, and the profession of guide enlists many of the mountaineers, who offer their services for They are hardy and mountain-climbers. brave, have a thorough knowledge of their territory, and at the same time are extremely

cautious. This occupation, like that of the peasants, is handed down from father to son; thus a climbing party may have among its guides "old Peter" and "young Peter," both experienced mountaineers.

Religion. Switzerland has complete religious liberty of conscience and creed, but the introduction of new religious orders, the establishment of new bishoprics, and the activity of religious sects whose action interferes with other creeds or endangers the state, are all restricted by the confederation. The German-speaking cantons of the central and eastern parts of the country are mostly Roman Catholic, while those of the north and west are mainly Protestant. The cantons of Lucerne, Valais, Fribourg, and Bernese Jura are in the majority Catholic, but the other Frenchspeaking cantons are chiefly Protestant. The farther south one travels, through the Roman Catholic cantons, the more frequently appear the great wooden crucifixes at turns in the road, or sheltered shrines to the Madonna, on lonely mountain pathways.

Elementary education is obli-Education. gatory in all of the cantons, but the law is most rigidly enforced in the Protestant communities. There are many trade and technical schools, and institutions for the deaf, dumb, blind, and mentally defective. The percentage of illiteracy among men eligible for military service is very low, only one out of one thou-

sand being unable to read. There are seven universities in the country, at Basel, Zurich, Bern, Geneva, Lausanne, Fribourg, and Neuchâtel. The Federal government maintains a polytechnic school at Zurich.

The Cities. Far different from the placid and picturesque life of the rural folk is that of the Swiss cities, where modern industries mingle with, but do not destroy, the charm of history that

clings about many of them. Those of special interest are described below:

Basel, bah' zel, lies on the Rhine, on the northern border of the country, forty-three miles north of Bern. The city originated in a frontier post of the Romans, in the fourth century. It contains many fine old buildings, including an ancient cathedral,

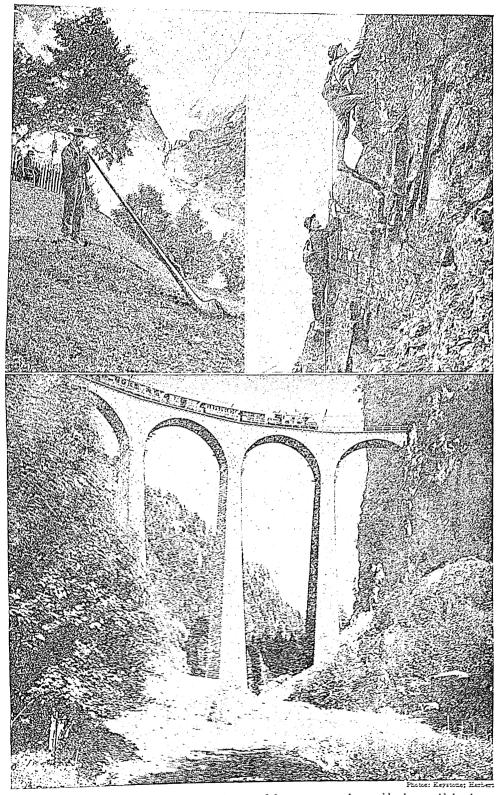


COMPARATIVE AREAS Switzerland is about as large as Massachusetts, Connecticut, and two Rhode Islands.

founded in 1019, containing the tomb of Erasmus, whose home was here; the oldest university of Switzerland, founded in 1459; a seminary for missionaries; and a museum containing a public library and fine pictures. The city also possesses a most

valuable collection of the works of the Holbeins, who, for a time, made their home in Basel (see HoL-BEIN).

Basel has been noted for over 200 years for the manufacture of silk ribbons; the manufacture of paper and aniline dyes, tanning, and brewing constitute the other industries. Basel is a great railway and distributing center, being the northern gateway of Switzerland, and since 1922 it has had one of the largest railway stations in Europe. In 1929 the city was selected as the location of the Bank for International Settlements (see International Settlements, Bank for). The population in 1930 was 148,063.



Picturesque Switzerland. In the Unsuadica in the upper lait a young man is seen blowing an Alpine horn.

Picturesque Switzerland. In the Unsuadica in the upper lait a young man is seen blowing an Alpine horn.

Right, climbers ascending the almost perpendicular site of a mountain. Below, a railway viaduct in a Swiss Right, climbers ascending the almost perpendicular site of a mountain. Below, a railway viaduct in a Swiss Right, climbers ascending the almost perpendicular site of a mountain. Below, a railway viaduct in a Swiss Right, climbers ascending the almost perpendicular site of a mountain. Below, a railway viaduct in a Swiss Right, climbers ascending the almost perpendicular site of a mountain. Below, a railway viaduct in a Swiss Right, climbers ascending the almost perpendicular site of a mountain. Below, a railway viaduct in a Swiss Right, climbers ascending the almost perpendicular site of a mountain. Below, a railway viaduct in a Swiss Right, climbers ascending the almost perpendicular site of a mountain. Below, a railway viaduct in a Swiss Right, climbers ascending the almost perpendicular site of a mountain. Below, a railway viaduct in a Swiss Right, climbers ascending the almost perpendicular site of a mountain. Below, a railway viaduct in a Swiss Right, climbers ascending the almost perpendicular site of a mountain.

Bern, behrn, or Berne, burn, since 1848 the capital of the republic, is beautifully situated nearly 1,800 feet above sea level, and is surrounded on three sides by the River Aar. It is called the finest city in Switzerland; its fountains, its arcade-covered walks, its fine bridges, and quaint old shops are a joy to the tourist. Among its imposing buildings are the great Gothic minster, built between 1421 and 1573; the Church of the Holy Spirit; the Federal Council buildings, or Parliament House, commanding a splendid view of the Alps; the Town Hall, built between 1406 and 1416; and the University. The city is noted for its woolens, linens, silk stuffs, stockings, watches, clocks, and toys. The population in 1930 was 111,783.

The name is taken from the German word Bären, meaning bears, and was adopted, according to legend, because many bears were killed on the day the city was founded. In consequence of this tradition, the bear is almost a sacred animal in Bern, and the municipality keeps a Bears' Den, on the right bank of the Aar, in which a number of fat brown bears are always on view. Bears in wood and stone are seen throughout the city, as architectural ornaments. A bear is included in the city coat of arms.

Geneva, je ne' vah, officially GENÈVE, is situated in view of the Alps, at the western end of Lake Geneva, at the outlet of the River Rhone. Geneva is distinguished as a theological, literary, scientific, and political center. It was the birthplace of the writer Rousseau, the naturalists Charles Bonnet and the Pictets, the humorist Töpffer, the physicist De Saussure, and the sculptor Pradier. In 1536, when Geneva invited Calvin to make his home there, it became one of the greatest strongholds of Protestantism in Europe (see Calvin, John). In 1919 it was selected as the seat of the League of Nations (which see). In 1928 a site was selected for the permanent office and conference hall of the League. A new building for the International Labor Office adjoins the League buildings. Geneva is also the headquarters of the Red Cross Societies of the world.

The ancient ramparts have been removed and many improvements introduced. Geneva is one of the principal entrances for tourists into Switzerland. Among its old buildings are the Transition Cathedral of Saint Peter, dating from 1124; the magnificent theater, one of the largest in Europe; and museums of antiquities, fine arts, and natural history. The staple manufactures are watches, clocks, music boxes, jewelry, gold and silver ornaments, and scientific instruments; and, in recent years, motor cars. Population, 142,812 (1930).

Interlaken, in tur lah' ken, whose name means between the lakes, is a village in the valley of the River Aar, between Lakes Thun and Brienz. It is one of the most popular resorts of the Alps, being visited annually by thousands of tourists. The highway between the lakes is a continuous line of hotels and boarding houses; a former Augustinian monastery, founded in 1130, and now occupied by government offices, forms the nucleus of the village. Population, about 4.000.

Lausanne, lo zaln', situated about one-half mile from Lake Geneva, is built on and around five hills, two of which are connected by a lofty viaduct. The city thus commands a fine view of the lake and the mountains of Savoy and Valais. The beautiful Gothic cathedral, the finest ecclesiastical building in Switzerland, built in the thirteenth century, is an imposing landmark. Close to the cathedral is a castle, built early in the fifteenth century; also near by is the

Palais de Rumine, containing an important local university. In recent years, Lausanne has undergone modern improvements, and many of the older picturesque buildings have been destroyed, or altered beyond recognition. The city is visited by a great number of tourists, and is well provided with hotels.

The opening of the Simplon Tunnel, in 1906, added greatly to transportation facilities and made the city animportant industrial center. It is as an educational center, however, that Lausanne is most famous, the splendidly conducted institutions attracting many foreign students. The population of 75,915 (1930) is composed chiefly of Protestants; French is the language spoken. See Lausanne, Treaty of.

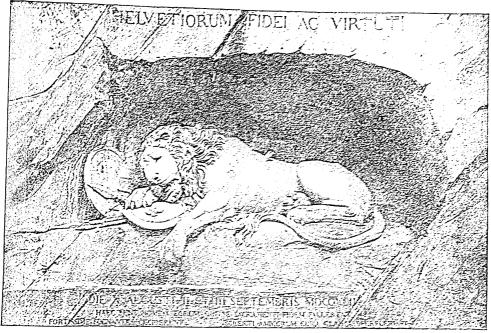
Lucerne, lu surn', officially Luzern, a quaint town located on the banks of Lake Lucerne. The city is divided into two parts by the River Reuss; the modern section, with broad streets and great hotels, is on the west, and the medieval town, of crooked, narrow streets and old-fashioned houses, is on the east. In the latter part are the Hofkirche, a church dating from 1506; the sixteenth-century town hall, with its collection of art and antiques; and the famous "Lion of Lucerne," a huge lion carved in solid rock, in memory of the Swiss Guards massacred in defense of the Tuileries, in Paris, August 10, 1792. The city is noted chiefly for its surrounding beauty. Population, 47,066 (1930).

Neuchâtel, nuh shah tel', lies on the banks of Lake Neuchâtel, twenty-five miles west of Bern. Built on a slope rising from the shores of the lake, the place has a charming situation. Among its interesting features are an abbey church, dating from the twelfth century, and the old castle of the Counts, of Neuchâtel, now used as a government building. Many fine public buildings, a university, museums of art and natural history, and a well-equipped public library bear witness to the progressiveness of the town. Neuchâtel is a railroad center of considerable importance; the chief industries are watchmaking and the manufacture of jewelry and electrical apparatus. Population, 22,668 (1930).

Saint Moritz, mo' rits, a famous resort and watering place, lies in the upper part of the great valley known as the Engadine, over 6,000 feet above sea level, and is the highest village in the valley. The views from this elevated site are superb, and attract thousands of visitors at all seasons. In the summer come health-seekers from many parts of Europe and America, to benefit from the city's famous baths, celebrated since the sixteenth century, when the noted physician Paracelsus first called attention to them. In the winter the remarkable facilities for skating and tobogganing which the region affords attract tourists from all over the world, constantly swelling the permanent population of less than 3,000.

Zurich, zu' riK, situated at the northern end of Lake Zurich, is the largest city of the republic. The old city, with its steep, narrow streets and old-fashioned houses, has a quaintly medieval aspect, but the newer sections are modern in every respect. The Limmat, which flows through the middle of the city and divides it into two parts—the Little City and the Great City—is crossed by eleven bridges. Among the noteworthy edifices are the National Museum, with many relics commemorating the history of the republic; the Municipal Library; the Romanesque cathedral, dating from the eleventh century, of which Zwingli, the famous Swiss reformer, was pastor; and Saint Peter's Church. Zurich is a noted educational center. The cantonal university, founded in 1832,

TO THE WOOD PROPERTY OF THE PR



THE LION OF LUCERNE

The inscription, freely translated, reads: To the Fidelity and Courage of the Helestians. The statue was carved in solid rock in memory of the Swiss Guards massacred in defense of the Tuileries, in Paris, on August 10, 1792.

is the most celebrated institution for higher learning in Switzerland, and is especially famous for its medical school. The Federal Polytechnicum, or engineering school, founded in 1855, is also located here. The city has many other excellent schools, and an interesting botanical garden, one of the finest in the world. Silk-weaving is the most important industry; cotton goods and machinery are also manufactured in the city. The population was 333,829, according to the census of 1941.

Physical Features, Resources, and Industry

General Features. The snow-clad Alps and the Jura range cover about three-fourths of the whole land, making Switzerland the most mountainous country on the continent of Europe. The loftiest masses of the Alps constitute the southern and central sections of Switzerland, and the Jura Mountains form a great curve in the northwestern part. Between these two mountain masses is an elevated plain, opening to the north, where the majority of the people find habitation.

In the Swiss Juras, there are no very lofty elevations, the highest summit, the Dôle, being a little over a mile above the sea, but the glacier-robed Alpine ranges send up many towering peaks, culminating in Monte Rosa, 15,217 feet, the Matterhorn, of solid rock, and the Jungirau (pages 4347, 3716). The Saint Gotthard group of mountains is the center of the great Alpine ranges, whose splendid scenery has attracted visitors from all over the world.

Waters. Four of the important rivers of Europe make their way through Switzerland, draining into four different seas. The Rhine, made up of the Vorder-Rhein and Hinter-Rhein, which take their rise in the Alps, flows

through Lake Constance; after emerging from the lake, it forms the northern border of Switzerland, whence it wends its way into the North Sea. The Rhone rises in the great Rhone Glacier, receives various mountain streams, widens into Lake Geneva, and flows finally into the Mediterranean. The Ticino finds its way through the Po into the Adriatic, an arm of the Mediterranean. The River Inn drains into the Danube, and thence into the Black Sea.

The melting of the snow in the mountains gives rise to many torrents, which rush foaming white down to the valleys. Switzerland is noted, too, for its waterfalls. The highest of these is Staubbach, in the Lauterbrunnen Valley, a lovely veil-like cascade which falls over 900 feet. The Handegg, near the source of the Aar, falls 225 feet, and the Pissevache, in the Rhone valley, 200 feet. The Reichenbach descends in seven falls, and the Giessbach in thirteen. The falls of the Rhine at Schaffhausen are only eighty-two feet in height, but an enormous mass of water descends.

Famous Lakes. The surface of Switzerland glimmers with myriads of lakes and Alpine

tarns. Of the larger lakes, those most famous for the grandeur of their scenery are the follow-

Constance (in German Konstanz) is a beautiful take of glacial origin, lying between Switzerland, Austria, and Germany. It is situated about 1,300 feet above the sea, at the north base of the Alps, and through it filters the River Rhine. It is about forty miles long and nine miles wide, and is divided into two branches at its northwest extremity. The north branch is called Ueberlinger See; the south, Untersee, or Zeller See. The surrounding country is given over to agriculture, with orchards and gardens, and is dotted with interesting ruins of ancient castles and prehistoric lake dwellings (which see). A characteristic of Lake Constance which cannot be explained, except on the unsatisfactory theory of rapidly melting snows, is its occasional sudden rise and fall. In 1770 it rose, in one hour, about twenty-four feet above ordinary level.

Geneva (in French Lac Léman, in German Gen-FER SEE), the largest lake in Central Europe, is partly in Switzerland and partly in France. It reaches a depth of 1,015 feet, and its total area is 224 square miles, of which only eighty-three square miles belong to France. The River Rhone enters the lake at the east, and emerges at Geneva at the west. The lake is noted for the unusual clearness and blueness of its waters, and is surrounded by a mountainous region of great beauty. On its shores are many famous resorts, including Geneva, Lausanne, Ouchy, Vevey, and Montreux. Many thousands of visitors annually flock to these resorts. Near the eastern end stands the Château of Chillon, prison of Bonnivard, immortalized in poetry by Lord Byron in The Prisoner of Chillon. See illustration, in article Chillon.

Lucerne, in North-Central Switzerland, is one of the most famous lakes in all Europe. It is roughly in the shape of a cross, with irregular, winding arms between steep, rocky cliffs, which, in some places, have pushed so far out into the water that they have made of Lucerne five divisions. Each of these divisions is shut off from the others, as far as the view is concerned, and each has its own particular beauty and hue, and abounds in picturesque scenery. The lake is about twenty-four miles long and two miles wide, with an area of about forty-five square miles. Around Lake Lucerne lived the men who laid the foundations of Swiss freedom, and associated with its shores is the mythical tale of William Tell.

Lugano, loo gah' no, known to the Italians as Lago Ceresio, lies at the foot of the Alps, its surface being 899 feet above sea level. It is situated partly in Lombardy, Italy, and partly in the Swiss canton of Ticino. The name is derived from the town of Lugano, the only important place on its banks. The winding length of Lake Lugano measures twenty miles, and is marked by rugged scenery of rare beauty. Picturesque villas dot the lower slopes of the surrounding hills, which abound in vineyards, olive and orange groves, and forests of chestnut and walnut. From Monte Salvatore, about 3,000 feet in height, a beautiful view of the picturesque town and lake is obtained.

Neuchâtel, the third largest lake of Switzerland, and the largest lying wholly within the country, is of historic interest as the former location of a group of lake dwellers (see Lake Dwellings). The lake is twenty-four miles long, and has an area of about ninety-two square miles. On its shores are a number

of towns and villages, and several rivers flow into it. The lake is practically an expansion of the River Thièle, which enters it at the southwestern end and flows out again at the northeastern. Neuchâtel is the most important town on its banks. There are attractive forests and vine-clad slopes along the lake; in other portions, the shore is low and swampy.

Zurich is a beautiful lake lying in a deep valley in the midst of the most charming scenery of Northern Switzerland, making it a favorite resort of tourists. The lake is crescent-shaped, and measures about twenty-five miles in length and from about one-half to two and one-half miles in width. It is spanned by a beautiful bridge, which serves as a delightful promenade. Palatial hotels afford accommodations for the thousands of tourists.

Climate, Plant, and Animal Life. The variations in altitude in Switzerland cause corresponding variations in climate and in the character of the vegetable life. In the valleys and on the lower mountain slopes, olives, beeches, oaks, pines, and firs grow. Higher up are the mountain pastures and rhododendrons, and above them come the eternal snows. On the central plain, there is an average annual rainfall of thirty-three inches, but in the higher regions the precipitation is much greater. The most remarkable prevailing wind is a hot, dry southwest or south wind called the föhn, which occurs most frequently in spring. The number of health resorts in Switzerland is evidence of its generally healthful climate.

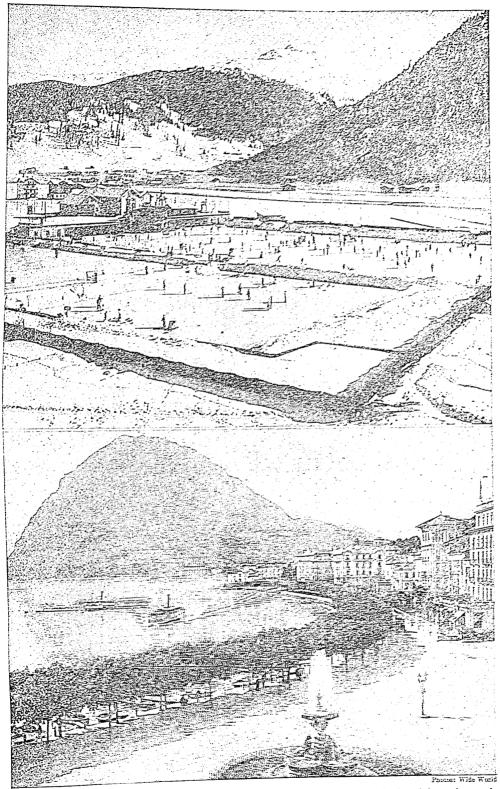
Game is no longer abundant in Switzerland, though the chamois and ibex are still found high up the mountains. The chief game birds

are grouse, partridge, and snipe.

The discovery that tuberculosis could be cured in dry, cold, clear air, as well as in a southern climate, is one of the factors in the development of Switzerland as a health resort. Sanitariums have been built at several points, and the hot springs and salt and mineral baths in Bern, Baden, and Schaffhausen attract numerous travelers. Magnificent scenery, a healthful climate, and unrivaled facilities for sports lure thousands of tourists, annually, to Switzerland, affording the republic one of its chief sources of income. This tourist travel, which declined during World War I, reached its prewar level in 1925, but almost disappeared again during World War II.

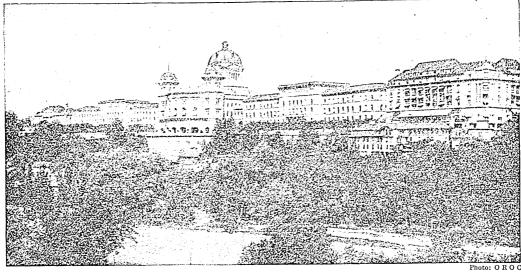
Agriculture. In spite of its mountains, glaciers, lakes, and rivers, over three-fourths of the area of Switzerland is productive. In addition to the forests, there are meadows and mountain pastures which support immense numbers of cattle and goats, reared for their The dairying industry milk, skins, and flesh. is important, and condensed milk and cheese are exported in great quantities. The lakes are important fishing grounds.

In the valley of the Vorder-Rhein, grain is cultivated at the highest known elevation in Europe. This is near the village of Tschamut,



Winter and Summer in the Pieyground of Europa. Above, at Davos is the largest skating rink on the continent; it covers more than seven acres. Below, another view of the waterfront at Lugano.

6975



THE CAPITOL BUILDING AT BERN

5,400 feet above the level of the sea. The grain is rye, and the growing season is so short that the peasants have erected a rude but ingenious drying apparatus in the fields, so that they will not have to depend upon the inconstant sun to dry their harvests. But there are many communities which do not depend even upon rye, but gain their entire subsistence from the alps, or mountain pastures, where they feed their cattle during the short summer months. In the highest of these mountain communities, snow commonly falls in June, and the cultivation of corn is impossible. Even a few patches of potatoes are ripened only with difficulty.

In the lower valleys, rye, oats, and potatoes grow more successfully, and nuts, olives, and grapes are produced in favorable places along the lakes and on the southern slopes of the mountains; nevertheless, the great proportion of the food supplies of the country must be

Though hampered by scarcity of coal and iron, the Swiss have made remarkable progress in manufacturing. Their cotton fabrics are

known the world over for their excellent quality, and their machine-made laces and embroideries are likewise famous. Silk ribbons made by the Swiss are among the best to be had, and Swiss watches, jewelry, and music boxes find their way into the markets of all the world. Wood carving, straw plaiting, and the manufacture of leather goods, woolen goods, confectionery, and machinery, are also important. The chief manufacturing cantons are Zurich, Glarus, Saint Gall, Appenzell, Neuchâtel, Basel, and Geneva.

Transportation. Switzerland has three main trade routes—the Rhine Valley, leading to Belgian and Dutch ports on the north; the Rhone Valley, opening to France on the west; and a railroad line southward through the Saint Gotthard Tunnel. The Simplon, the longest railroad tunnel in the world, pierces the Alps between Switzerland and Italy. There are 3,607 miles of railroad, most of which are electrified. Over half of the railroads are owned and operated by the national government. There is also a network of highways, and these are kept in admirable condition.

Government and History

Government. Switzerland is a confederation of twenty-two cantons, three of which, Basel, Appenzell, and Unterwalden, are politically divided into two half-cantons each. Four are called Forest Cantons, namely, Schwyz, Uri, Unterwalden, and Lucerne. They are grouped about Lake Lucerne. As Schwyz was the most prominent in the war for freedom, and members of the confederacy for independence were known to the outside world as Switzers, this canton ultimately gave its name to the entire league. Each canton has its own constitution

and local government, and is divided for administrative purposes into districts. The districts are, in turn, divided into communes. In nearly all of the cantons, the principle of the initiative and the referendum is successfully applied. The Swiss cantons are republics in miniature, having extensive powers in local

The executive power is vested in a Federal Council of seven members, elected for a term of three years by the Federal Legislature, or Federal Assembly, each Council member repre-



An interesting view in a Swiss village street. The young women are wearing their Sunday and holiday costumes.

Thousands of tourists every year are delighted by such scenes as this.

senting one of the seven departments of administration. No decision is effective unless made by a majority of the members. The president of the Council, elected by the Federal Assembly for a term of one year, is also President of the Swiss Confederation during that time.

The Legislature is composed of two houses, the National Council and the Council of States, the Swiss names for these bodies being Nationalrat and Ständerat. The Council of States is composed of two members from each canton, whose terms vary from one to four years. Each canton regulates the tenure of office, salary, and qualifications of its own representatives. The National Council is made up of members chosen for four-year terms by direct universal suffrage, the membership being apportioned on the basis of one Deputy to every 22,000 persons.

Popular control of legislation has reached its highest perfection in Switzerland, by virtue of the initiative and referendum. The initiative grants the people the right of petitioning the Legislature to make a law or to adopt an amendment to the Constitution; the referendum gives them the right to ask that a law passed by the Federal Legislature be submitted to the popular vote. The latter right has been a part of the Swiss law since 1874.

Defense. Switzerland's natural defenses of mountains are supplemented by fortifications

defending the Saint Gotthard Pass on the south, and the Rhone Valley on the north. Its defense in man power is in the national militia, service in which is compulsory. Men from the ages of eighteen to sixty are liable for service.



HARVEST ON THE MOUNTAINSIDE
Dragging home the crop of hay from high Alpine fields in the Engadine.

Switzerland, if it were invaded, could muster a defending force of more than 500,000 men under arms.

History. The country in Roman times was the home of the Helvetians and the Rhaetians, who at different times were conquered by Roman armies. During the German invasions, Switzerland was occupied by the Alemanni and the Burgundians, and eventually the whole country became a part of the empire of the Franks. In the eleventh century, it came under the rule of the German emperors, and so became a part of the Holy Roman Empire. Late in the thirteenth century, the House of Hapsburg, the imperial dynasty of Austria, became very powerful in the country. The tyranny of

the Austrian rulers led to the formation, in 1291, of a league of three Forest Cantons— Uri, Schwyz, and Unterwalden. These cantons entered into a perpetual alliance to resist Austrian oppression, and this union was the first step in the war for Swiss independ-

The annals of this period abound in tales of heroism. Typical of the spirit of the time, though perhaps not

historically accurate, is the story of William Tell. In 1315 the first blow for liberty was struck when the confederation defeated the Austrians at the Battle of Morgarten. victory gave the Swiss seventy years of peace.

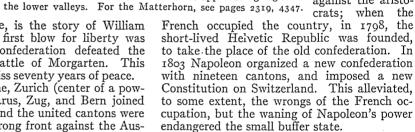
Meantime Lucerne, Zurich (center of a powerful coalition), Glarus, Zug, and Bern joined the confederation, and the united cantons were able to present a strong front against the Austrians when war was renewed in 1386. At Sempach (1386), where Arnold Winkelried "made way for liberty and died," and at Näfels (1388), the Swiss were completely victorious, and Austrian power was permanently weakened.

In 1415 the cantons began offensive warfare, compelling Austria to relinquish Aargau, and about half a century later, they added Thurgau to their country. Then followed a war with Charles the Bold of Burgundy, in which the Swiss were again victorious. In 1481 the confederation was strengthened by the addition of the towns of Fribourg and Solothurn. Eighteen years later (1499), the Emperor Maximilian I began a war to place the Swiss again under the rule of the empire, but the cantons held their ground in six desperate battles. Though they were practically independent from this time on, their independence was not formally recognized until 1648, when the Peace of Westphalia was ratified. In 1501 Basel and Schaffhausen came into the confederation, and in 1513 Appenzell was admitted.

The Protestant Reformation, which began in Germany in this period, soon made itself felt in Switzerland, and the cantons were involved in religious wars in the sixteenth century. Through the influence of Zwingli and of Calvin. the latter of whom made Geneva his headquarters, Protestant doctrines spread rapidly through the country; difficulties between opposing factions were partially adjusted by the

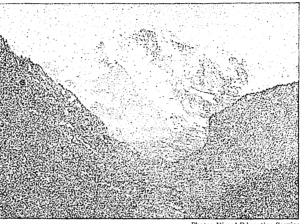
Peace of Westphalia, which closed the Thirty Years' War.

Dissension between religious factions and a growing political aristocracy, with oppressive power in the hands of a few, marked the next century and a half in the loosely knit Swiss Confederation. The French Revolution affected many of the cantons, causing minor revolts against the aristo-



When the affairs of troubled Europe were settled, in 1814-1815, by the Congress of Vienna, the powers acknowledged the inde-pendence of Switzerland and guaranteed its perpetual neutrality. A confederation of twenty-two cantons was organized (three being divided into half-cantons). The Constitution of 1815 had placed emphasis on the rights of cantons rather than on a union, and years of strife between Catholics and Protestants and between aristocratic and democratic factions followed. After the Revolution of 1848, the old federation of states gave way to a federative state, with strengthened central powers and efficient government. A further revision of the Constitution in 1874 gave more extensive powers to the central government. Various progressive laws were later enacted, including legislation for old-age pensions and workingmen's insurance.

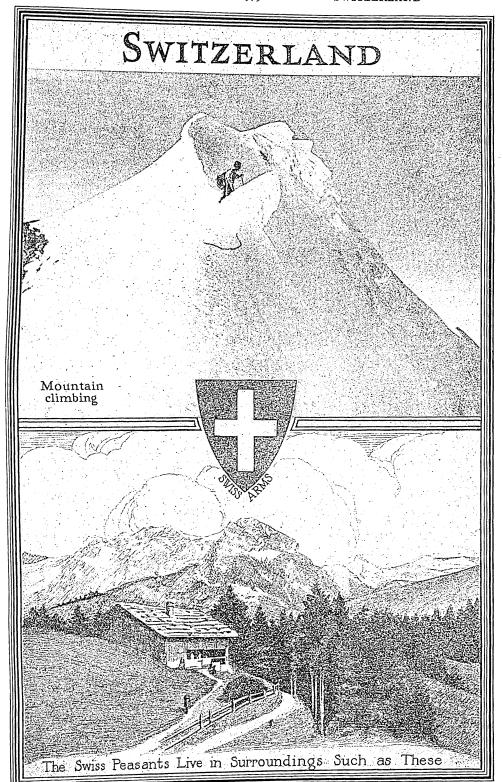
Since that date, Switzerland has made rapid progress. During World War I, the country maintained its neutrality successfully, though



THE MAJESTIC JUNGFRAU Bathed in sunshine after the shadows of approaching night fill SWITZERLAND

6979

SWITZERLAND



OUTLINE AND QUESTIONS ON SWITZERLAND

Outline

I. Location

- (1) Latitude, 45° 49′ 2″ to 47° 48′ 32″ north (2) Longitude, 5° 57′ 26″ to 10° 29′ 40″ east
- (3) Relation to other countries
- (4) Absence of seacoast

II. Size

- (1) Actual area, 15,976 square miles
- (2) Area compared with that of states and other countries

III. The People and Cities

- (1) Population
- (2) Radical strains
- (3) Dominant characteristics
- (4) Struggle for livelihood
- (5) Religion
- (6) Education
- (7) Cities

IV. Physical Features, Resources, and Industry

- (1) General features
- (2) Famous lakes
- (3) Climate
- (4) Plant and animal life
- (5) Agriculture
- (6) Manufacture
- (7) Transportation

V. Government

- (1) Confederation
- (2) Defense
 - (a) Universal liability to military service

VI. History

- (1) The early days
- (2) Under the Holy Roman Empire
- (3) Under the House of Hapsburg
- (4) The struggle for independence
- (5) The Reformation
- (6) The period of internal troubles
- (7) Establishment of a stable government
- (8) Switzerland and the World War

Questions

How many languages are spoken in this little country?

What is the drop of the highest of Swiss waterfalls? How does this compare with the drop of Niagara?

What famous poem celebrates a castle in Switzerland? Where is this castle located?

Why would you not be likely to have as your guide in mountain-climbing the son of a Swiss peasant farmer?

Where is the highest elevation on the continent where grain is raised? To what measures do the farmers have to resort to dry their crops? Why?

Who "made way for liberty, and died," and how did he do it? What is the tallest mountain entirely within Switzerland?

What difficulties do the mountain peasants meet? What constant danger do they face?

What special part did the three Forest Cantons play in the history of the country? In what sense may Switzerland be called the "playground of Europe"? What other claims to distinction has Switzerland?

often under great difficulties. The outbreak of World War II brought new dangers. Germany and Italy, threatening to annex Switzerland, encouraged antidemocratic movements within it. Swiss overseas trade was cut off. Food became scarce and factories idle. Neverheless the Swiss mobilized their army and prepared to defend their country.

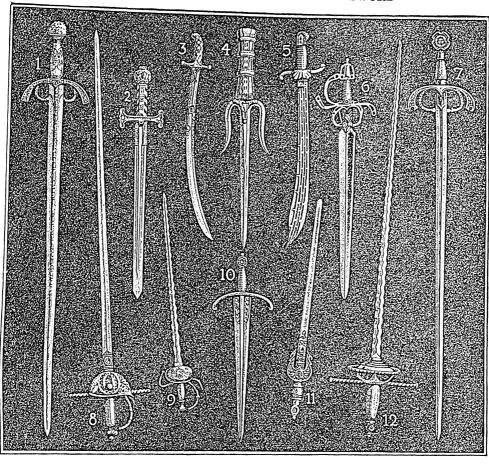
M.P.

Related Subjects. The following articles in these volumes will give added details as to the geography and life of Switzerland:

HISTOR

Austria-Hungary Calvin, John Franks Helvetii Holy Roman Empire League of Nations

Reformation
Tell, William
Thirty Years' War
Winkelried, Arnold
World War
Zwingli, Ulrich



SOME FAMOUS SWORDS

(1) Sword of Isabella of Spain.
 (2) Francis I of France.
 (3) Persian sword of the sixteenth century.
 (4) Moorish boarding sword.
 (5) Cutlass of the sixteenth century.
 (6) Sword of the sixteenth century.
 (7) Sword of a medieval naval chief.
 (8) Sword of the early modern period in Scandinavia.
 (9) Flaming sword of Don Juan of Austria.
 (10) Sword of the fifteenth century.
 (11) Sword of a cardinal in the court of Philip IV of Spain.
 (12) Flaming sword of Philip IV.

MOUNTAINS

Alps Jungfrau Matterhorn Mont Blanc Monte Rosa Saint Gotthard

RIVERS

Rhine

Rhone

UNCLASSIFIED

Avalanche Chillon Edelweiss Glacier Saint Bernard, Great Simplon

SWITZERLAND OF AMERICA, a term applied to British Columbia (which see).

SWORD, solved, one of the most ancient of all weapons of offense and defense, whose origin is lost in remote antiquity. As soon as the art of working metals was discovered, the ingenuity of man was turned toward the manufacture of destructive weapons. The earliest forms of swords of which authentic information is available were those of the Assyrians, Gauls, and Greeks. The swords used by these people

were made of bronze, and were short, twoedged weapons. The Roman sword, a terrible weapon in the hands of trained legionaries, was of steel, short and straight, with a sharpened point and two cutting edges.

With the invention of gunpowder, weapons designed for close combat nearly passed into oblivion, but the light rapier remained the recognized dueling weapon. High art was exercised in the tempering of rapier blades, Toledo, Spain, becoming famous for the fine quality of its product. The favorite weapon of the East was the scimitar, a blade with a pronounced curve. Damascus was noted for its scimitar blades.

The Sword in Modern War. The cavalry of modern armies bear swords of from two and one-half to three feet in length and about two and one-half pounds in weight, but as the value of cavalry in combat declines, such ap-

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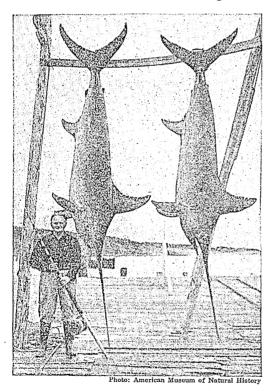
purtenances become of less value. In the United States army, the sword proper has given place to the saber, which is designed for both

cutting and thrusting.

In World War I, experience proved that there was little opportunity for use of the sword. There was practically no cavalry action, and the best weapon for the intrepid charge was the bayonet, which all soldiers were taught to use with deadly precision.

Figurative Use of the Word. The sword has been from Bible times a favorite figure of speech to denote strife and conflict. "He that liveth by the sword shall perish by the sword" has a lesson for civil life, as truly as for the military. The Hebrew prophets sought to have the swords of the nation turned into plowshares, while the New Testament speaks of "the sword of the Spirit."

SWORDFISH, an ocean fish of great size with a long, naked body, and a prolonged, flattened upper jaw that resembles the weapon from which it derives its name. Though found



SWORDFISH

Swordfish taken off Louisburg, Cape Breton, Nova Scotia, by Michael Lerner Cape Breton Expedition.

most commonly in the Atlantic Ocean, it occurs also in the Pacific, and especially in the neighborhood of the Santa Barbara Islands, Southern California. The average length of a swordfish is seven feet, and the weight is about 250 pounds, but specimens weighing 600 or 800

pounds and measuring from ten to fifteen feet long are recorded.

Their "swords," sharp-edged and strong, and half as long as the body, are powerful weapons. Because they are among the most daring of the deep-sea animals and fearlessly attack anything from schools of small fish to whales and even boats, the swordfish are widely referred to as "gladiators of the deep." They are highly regarded by big-game anglers. Several instances of swordfish charging boats and piercing the hulls are known; the sword is nearly always broken off by the impact, however. But unusual photographs taken off the Mexican fishing banks in April, 1939, showed a striped marlin (sometimes called swordfish) with intact sword that had penetrated both half-inch sides of a boat built of redwood. Commercial fishermen capture these fish by harpooning them from a pulpit on the bow of a sailboat, while the fish basks near the surface. The flesh is coarse, but when cut and cooked as a steak, it has a good flavor. Swordfish prey upon squid and upon menhaden, herring, mackerel, and other fish that travel in schools.

Scientists have not made conclusive studies of swordfish. The true swordfish is the type just described. Others have pointed, bony spikes replacing the sword, and are known as spearfish, which are divided into two groups, according to the shape of the fin on the back. Those having the exceedingly large fins are referred to as sailfish, of which there are a number of species.

Scientific Name. The swordfish is known as Xiphias gladius.

SWORD OF DAMOCLES, dam' o kleez. See Damocles.

SYCAMORE, sik' a mohr, an attractive shade tree of the plane-tree family, whose hard. reddish-brown wood is used in making furniture and various kinds of woodwork. It is found abundantly in fertile bottom lands and along streams, and is distributed from southern Maine to the north shore of Lake Ontario, west to Minnesota and Nebraska, and as far south as Texas and Florida. This tree grows from 75 to 120 feet high. On the lower trunk its bark is a dark reddish-brown, and on the limbs an olive-green. The bark on the branches breaks off in small scales, exposing an inner bark of light color, and giving an effect expressed in the familiar phrase-"hoaryantlered sycamore."

The broad leaves, which furnish delightful shade, are yellow-green with a pale lining, and have irregularly cut margins and prominent veins. There are two kinds of flowers, those bearing stamens and those bearing pistils. The former are a deep red, and the latter a pale green with a tinge of red. They open in May, when the leaves unfold. The fruit of the syca-



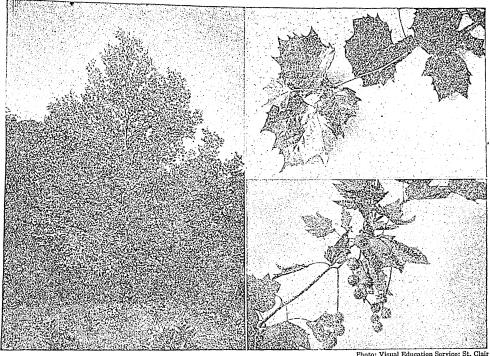


Photo: Visual Education Service; St. Clair

SYCAMORE TREE, LEAVES, AND BALLS

more is a dry seed ball, which hangs from a flexible stem. Other names for this tree are buttonwood and American plane tree. G.M.S.

Scientific Name. The botanical name of the planetree family is *Platanaceae*. The tree described above is *Platanus occidentalis*.

SYDENHAM, sid' en am, CHARLES EDWARD POULETT-THOMSON, first Baron (1799-1841), a British statesman and colonial administrator, Governor-General of Canada from 1839 to 1841. After a distinguished career in England, he was sent to Canada to bring about the legislative union of Upper and Lower Canada (later Ontario and Quebec), a duty which he fulfilled with very general satisfaction. As a reward, in 1840 he was created Baron Sydenham of Kent and Toronto, but lived only a year to enjoy this new honor.

Sydenham, or Poulett-Thomson, as he was better known, was born at Wimbledon, Surrey, England. In 1826 he was elected to the House of Commons, in 1830 he entered Earl Grey's Ministry as Vice-President of the Board of Trade, and in 1834 became its President. During these years, he was conspicuous as a reformer along economic lines; tariff laws tending toward free trade, banking and factory legislation, the abolition of usury laws, and commercial treatics with foreign countries, were some of the many subjects which showed the marks of his work. His sudden death, from an accident, came before he had developed his powers

to the full, but not before he had made a place for himself in history.

SYDNEY, capital and metropolis of New South Wales (which see).

SYDNEY, N. S., the second largest incorporated city of the province, ranking next to Halifax. It is situated on the northeast coast of Cape Breton Island, and is the terminus of the Sydney & Louisburg Railway and of the eastern division of the Intercolonial Railway (Canadian National). There is regular steamship connection with all important Canadian Atlantic ports. North Sydney and Sydney Mines are on the opposite side of the harbor. Sydney is 276 miles from Halifax. Population, 28,305 (1941).

The city is noted for its coal trade and for its extensive production of iron and steel. It is the commercial center, both for wholesale and for retail trade, of the great coal field in Canada. The plant of the Dominion Iron & Steel Company, which cost \$40,000,000 and employs 4,000 men, is the greatest of its many industrial establishments.

SYDPROVEN, largest of the settlements of Greenland (which see).

SYENITE, si' e nite. See Granite. SYLLOGISM, sil' o jiz'm. See Logic. SYLVAN LAKE. See South DAKOTA

(Rivers and Lakes).

SYLVIUS, AENEAS. See PIUS (II, Popes). SYMBOL, sim' bol, a sign by which one knows or recognizes an object or an idea. In

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one sense, all words are symbols. Spoken words are the symbols for objects and ideas. The letters of the alphabet are symbols for particular sounds, and these symbols are combined to form the written words which are the symbols

for spoken words.

One of the most conspicuous and familiar symbols in all nations is the national flag. To every person, the flag of his nation means "my country." Colors have a recognized and almost universal symbolism, and so have animals. Black is the symbol of grief among Americans and Europeans; white is the symbol of innocence (though in some countries it symbolizes mourning); blue stands for sincerity; and purple for royalty. A lion is the symbol of courage; a lamb suggests meekness; the dove and the olive branch typify peace.

Every religion has symbols, particularly pictured ones. In all ages since the Crucifixion of Christ, the Cross has been the recognized symbol of Christianity throughout the civilized The ship was an early world (see Cross). Christian symbol which represented the Church, in which "the faithful are carried over the sea of life." The Gospel writers are represented by symbols: the winged man is Saint Matthew; the winged lion is Saint Mark; the winged ox is Saint Luke; and the eagle is Saint John. Other saints carry symbolic emblems by which they may be recognized-Saint Mary Magdalene by a box or vase (for ointment); Saint Paul by a sword; Saint Andrew by a cross.

In mythology there are innumerable symbols, such as the trident, which is the symbol of Neptune; the peacock, of Juno; and the mirror or apple, of Venus. Neptune's trident is used in astronomy to designate the planet which bears his name. Another pictured symbol is the skull and crossbones, which, according to the law, must be placed on all bottles and boxes containing poison. This symbol was once the emblem on the flag flying from the mast of pirate ships, white on a black ground; then, as now, it symbolized death.

The sciences—mathematics, chemistry, astronomy, botany, and biology-have special sets of symbols for representing the different objects, elements, and operations involved, which are used in place of words. Some of the symbols in astronomy are so ancient that their origin is unknown. The symbols for the principal heavenly bodies are:

Sun 🔾	Jupiter 2	Pallas 2
Venus ♀	Uranus III	Vesta 🙇
Moon)	Mercury &	Saturn b
Ceres 🔾	Earth ♂ and ⊕	Neptune Ψ
Juno 🌣	Mars o	_

A star is represented thus: **.

The phases of the moon are indicated in this manner: new moon; moon in first quarter; @ full moon; @ moon in last quarter [see Moon (Phases of the Moon)].

Mathematical symbols are numerous, and most of them are very familiar. First, there are the symbols of value, the Arabic and Roman numerals, and the letters of the alphabet: then there are the symbols of operations, such as +, the sign of addition; -, of subtraction; \times , of multiplication; \div , of division. The character # (pi) stands for the number 3.1416, which is used in computing the area, circumference, and diameter of circles; c stands for circumference, d for diameter, v for volume, a

In chemistry, the first or the first with another letter of its English, Latin, or German name is used to designate a metal or an element. Hg (from the Latin) is the symbol for mercury; Fe (also from the Latin) is the symbol for iron. H stands for hydrogen, and O for oxy-Such a symbol not only represents an element, but it also stands for a specific quantity of that element. O always means sixteen parts, by weight, of oxygen; Fe always means 56 parts, by weight, of iron. So a chemical formula may be constructed simply by putting down the letters of the elements composing the compound. Small numerals may be added to each letter to show exactly what proportion Thus, the formula for water is H_2O ; Ag Cl represents the composition of silver chloride; $Al_2(SO_4)_3$ that of aluminum sulphate [see the article CHEMISTRY (The Elements)].

SYMPATHETIC INK. See COBALT. SYMPATHETIC NERVOUS SYSTEM. See NERVOUS SYSTEM.

SYMPHONY, sim' fo nie, a musical composition written for the orchestra. It consists usually of four movements, in form being the same as the sonata (which see). Haydn was the first great master to use the modern symphony form, but it was through the genius of Mozart and Beethoven that the symphony attained its present high rank, that of the loftiest form of instrumental composition. See Or-CHESTRA; MUSIC.

SYMPHONY ORCHESTRA. See ORCHES-TRA, subhead.

SYNAGOGUE, sin' a gog, a place of local worship among the Jews. Supposed to have originated at the time of the Babylonian Captivity (sixth century B.C.), it was in existence, wherever the Jews had settled, at the time of Jesus, and continues among them to the present day.

In New Testament times, the synagogue was built at the cost of the community. It was so constructed that the worshiper, on entering or at prayer, faced in the direction of Jerusalem. The furniture included a chest, known as the Holy Ark, in which were kept the rolls of Scripture used in the service; a lamp that burned perpetually, symbolizing the presence of Jehovah; candlesticks for use on Sabbath and feast days; a rostrum for the reader, and prob-

ably a desk on which to rest the roll; seats for the elders, in front of the Ark and facing the people; and seats for the congregation, the men on one side and the women on the other, divided by a screen. The ruler of the synagogue was responsible for the service, and he chose those who should take part. The elders formed the lesser Sanhedrin, a body having civil and religious authority over local cases. They were examined by members of the great Sanhedrin, but were elected by the congregation.

The Great Synagogue, a body of 120 members, was probably organized at the time of Ezra and Nehemiah, to define and teach the Law. It is believed to have finally determined the Old Testament canon. At a later period, it became merged with the Sanhedrin (which see).

SYNAPSE, sih naps'. See Nervous Sys-TEM (Structure of Nerve Tissue).

SYNCOPATION, sin ko pa' shun. Music (A Course of Lessons: What Is Ragtime?)

SYNCOPE, sin' ko pe. See FAINTING. SYNDICALISM, sin' dih kal iz'm, a term derived from the French word for trade unionism. It is based on the Marxian view that in present-day society the wage earners, the proletariat, are engaged with the property owners, the bourgeoisie, in a class struggle that will terminate in a social revolution.

The objective of the struggle is the collective management of each industry by the workers who are engaged therein, whether manual or mental. Thus the railroads are to be managed by the railway workers, the coal mines by the coal miners, and so on through the whole industrial range.

All of these syndicates, functioning without external compulsion, are to be joined in a national federation, to take the place of the State, and render such administrative and statistical services as are necessary.

In realizing its objective, syndicalism hopes to make use of the trade unions. According to the syndicalists the trade unions, in their struggle to raise wages, reduce the hours of labor, and improve working conditions, perform a useful function. Trade unions develop the workers' class consciousness; they train the workers in the tactics of class warfare; and they educate them for the social revolution. If, however, the trade unions are to serve the syndicalism movement effectively they must use all their weapons—the strike, the boycott, and particularly sabotage—in a militant fashion against the employers and against the State. Finally when the capitalists are weakened and discouraged, the syndicalists plan to call a general strike, and in one supreme effort take control of all industry.

Of recent years syndicalism has declined in importance, principally because of the wide-spread growth of communism, which has won over numerous syndicalist leaders. Moreover, the prospect is that it will remain comparatively unimportant, due to the fact that its underlying philosophy and methods are out of harmony with modern trends, especially the trend toward nationalism, increased governmental authority, and the demand of the workers for immediate economic security. E.J.

Related Subjects. The reader is referred to: Sabotage Boycott Capital Socialism Labor Organizations Strike

SYNECDOCHE, sin ek' doh ke, a figure of speech in which a part of a thing is used for the whole, or the whole for a part. It may be considered a form of metonymy. The expression "a fleet of forty sail" contains an example of synecdoche, sail being used for ship, or ships, or a part for a whole.

Related Subjects. For purposes of comparison, the following articles may be consulted:

Figure of Speech Metonymy Simile Metaphor

SYNGE, sing, John Millington (1871-1909), an Irish dramatist, born at Rathfarnam, near Dublin. He was graduated from Trinity College, and later is said to have wandered over Europe, a silent, poverty-stricken man in ill health. During this period, he picked up numberless stories and legends among the common people. These were afterward depicted faithfully in his plays.

After the completion of Aran Islands and the production of several short poems, he began, in 1903, to write plays, the prevailing note of which was sadness, whether they were comedies or tragedies. His work has been produced with success both in Europe and in America; all the completed dramas deal with Irish peasant life, of which he gives fearless, melancholy, tragic, and humorous pictures. He was in Dublin, working on Deirdre of the Sorrows, at the time of his death.

Other Works. These include The Playboy of the Western World, The Shadow of the Glen, The Tinker's Wedding, Riders to the Sea, and The Well of the Saints.

SYNOD, sin' ud. See Presbyterians. SYNODIC, sih nod' ik, PERIOD. See Moon (Orbit, Size, and Distance).

SYNONYM, sin' o nim. See Dictionary. SYNOVIAL, sih no' vih al, FLUID. See Joints; Secretion.

SYNTAX, sin' taks, a division of grammar that treats of the orderly arrangement of words to form sentences, and the grammatical relations of words in the sentence. Syntax is derived from a Greek word meaning to put together in order, used to indicate the drawing up of an army in battle array. It is thus an appropriate term to describe the building up of sentences, which may be described as the marshaling of words to express thought.

The relation that any word bears to the other words in the sentence is known as its syntax or construction, and when an expression is used ungrammatically, we say that such use is an error in syntax. The use of a singular verb with a plural subject, for instance, as They was here, is an error in syntax. In the study of grammar, the student not only learns how to put words together to make sentences, but he learns how to take the sentences apart—to break them up into the elements of which they are composed. The first process is known as synthesis, and the second as analysis.

Related Subjects. The various phases of this subject are discussed in detail in the articles listed below. In the articles on the parts of speech, full directions are given for parsing, and special errors are pointed out. See:

Inflection Adjective Adverb Interjection Analysis Article Noun Parsing Case Comparison Participle Conjugation Person Conjunction Preposition Declension Pronoun Punctuation Gender Grammar (Sentence-Sentence Building) Infinitive Verb

SYNTHESIS, sin' the sis, means, literally, the putting together of two or more elements, as in logic. See Thought; Syntax.

SYNTHETIC PLASTICS, sin thet' ik plas'-See Celluloid; Bakelite; Plastics.

SYPHILIS. See VENEREAL DISEASES. SYRACUSE, seer' a kuse, one of the most powerful cities of the ancient Grecian world, on the site of which a modern city is now located. Near the close of the eighth century B.C., a band of colonists from Corinth made a settlement on the small island of Ortygia, near the Sicilian shore. The colony developed into a rapidly growing city that soon spread over to the main island, which was connected with the islet by a causeway.

Ancient Syracuse had a long and eventful history. In the fourth century B.C., under the rule of Dionysius the Elder (which see), it became a center of Greek art and culture, and won renown because of a victorious war with Carthage. In 212 B.C., however, the city was captured by the Romans, whose fleet had been set on fire by the burning glasses of the famous mathematician Archimedes (which see). Thereafter the city gradually declined, being reduced finally to its ancient limits. Ortygia, the present site, is now a peninsula.

Modern Syracuse, officially SIRACUSA, the capital of a province of the same name. Population, 53,166 (1936). It is noted chiefly for its ruinsmonuments of past glory. Some Doric columns of antiquity may be seen in a cathedral erected about the ruins of a temple. The fountain of Arethusa, famed in legend, is in the southern part of Syracuse. See ARETHUSA.

SYRACUSE, BATTLE OF. See FIFTEEN DE-CISIVE BATTLES.

SYRACUSE, N. Y., the fourth city in size in the state and the county seat of Onondaga County, is situated 148 miles west of Albany and 150 miles east of Buffalo. Its location in an extensive and rich agricultural section, and its excellent transportation facilities, have made the city an important manufacturing and distributing center. Population, 205,067

Syracuse occupies an undulating site on Onondaga Lake, in one of the most beautiful scenic areas of the state, near the Finger Lakes region. The streets are wide, and many of the residential thoroughfares, such as James, West Onondaga, and East and West Genesee streets, and University Avenue, are framed by arches formed by ancient elms. The park system comprises over 400 acres, the largest of the parks being Onondaga, Burnet, Kirk, Schiller, Lincoln, and Thornden. Green Lake, at Jamesville, close to the city, is a state park. The commercial district is substantially built, and contains many modern and imposing buildings grouped around Saint Mary's Circle.

Transportation. The railroads serving the city are the New York Central, the West Shore, and a branch of the Delaware, Lackawanna & Western. Syracuse is located on the New York State Barge Canal, connections being made through Onondaga Lake and the Seneca River to the Hudson River and Lake Erie, and through the Oswego Canal to Lake Ontario and the Saint Lawrence River. A number of motorbus and truck lines give additional passenger and freight service.

Commerce and Industry. The first industry of the city was the exploitation of the salt deposits, but the salt works have long since been abandoned. Salt, however, brought to the city another important industry, the use of this mineral in the manufacture of soda ash and bicarbonate of soda, together with many by-products. The industry is controlled by the Solvay Process Company. The brine used by this company is brought through pipes from wells twenty miles south of the city. Syracuse leads in the manufacture of air-conditioning equipment, tool steel, agricultural implements, chinaware, wax candles, mincemeat, powdered milk, typewriters, electrical hardware, steam clothes-pressing machines, shoes, boilers and radiators, and cash-carrying and conveying equipment. There is a large export trade.

Institutions. The city is the seat of Syracuse University (which see). Other educational institutions include Saint John's Academy (Roman Catholic), Pebble Hill School, and Saint John's Military School (Episcopal). The Court of Appeals Law Library, housed in the courthouse, belongs to the state and has over 40,000 volumes.

History. The settlement of the city was begun in 1805, and it was known as South Salina, Bogardus' Corners, Cossitt's Corners, and Milan, until it was finally named Syracuse, for the ancient city in Sicily. It became a village in 1825; in 1847 it annexed Salina and was chartered as a city. Since that time, the city has increased in area to over twenty-five square miles, the year 1927 marking the annexation of Eastwood and Onondaga Valley.

The land on which the city was built, and that adjacent to it, were originally owned by the Onondaga Indians, the name signifying "People of the Hill." The state later purchased the salt springs from the Indians and leased them to the salt manufacturers. Soon the Indians were assigned to a reservation south of the city, and they are the hereditary keepers of the Long House, the symbol of the league or government. This reservation, known as Onondaga, is the capital of the Iroquois Confederacy [see Indians, American (Iroquoian)].

Syracuse is the home of the New York State Fair, held annually under the auspices of the State Agricultural Society, the buildings of which represent an investment of \$6,000,000. The city has an airport, and is a regularly scheduled stop on the air-mail route from Albany to Cleveland.

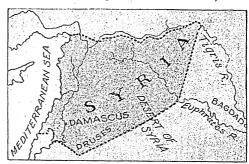
SYRACUSE UNIVERSITY, a coeducational institution, founded at Syracuse, N. Y., in 1870, as a continuation of the Genesee College (1833-1871) of Lima, N. Y. The medical department grew out of the Geneva Medical College (1835-1872), which had succeeded the Fairfield Medical College (1812-1839). Though founded by the Methodist Episcopal Church, and always under its patronage, the institution was made non-sectarian by a change of charter in 1920. Its 100-acre campus, located on a hill, commands a superb view. The university includes the colleges of liberal arts, fine arts, medicine, law, applied science, agriculture, business administration, and home economics, the teachers' college, a graduate school, and the New York School of Forestry. There are also schools of public speech, library science, citizenship, and nursing. The athletic field has a stadium seating 30,000. The faculty numbers about 600, the student enrollment is about 10,000, including extension school and summer school.

SYR-DARYA, seer dahr' yah, RIVER. See Aral Sea.

SYRIA, an independent state, under mandate of France since 1922. Formerly a part of Turkey, Syria extends from the Mediterranean Sea east to Iraq, and from Turkey, on the north, to Palestine and Trans-Jordan, on the south. Since 1925 it has comprised four territories—Syria, Lattaquié (Latakia), Lebanon, and Jebel Druze. The total area is estimated at 57,000 square miles. The population was 3,630,000 in the 1935 census.

Modern Syria occupies a narrow strip of country wedged between sea and desert, on the one hand, and between two strong Mohammedan powers—Turkey and Arabia—on the other. The country, in general, is divided into eastern and western table-lands by a nar-

row rift valley over 400 miles in length. There are several mountain ranges along the coast, the loftiest being in Lebanon. As vapor-laden winds blowing from the sea lose their moisture on the seaward slopes of the mountains, most



INDEPENDENT SYRIA

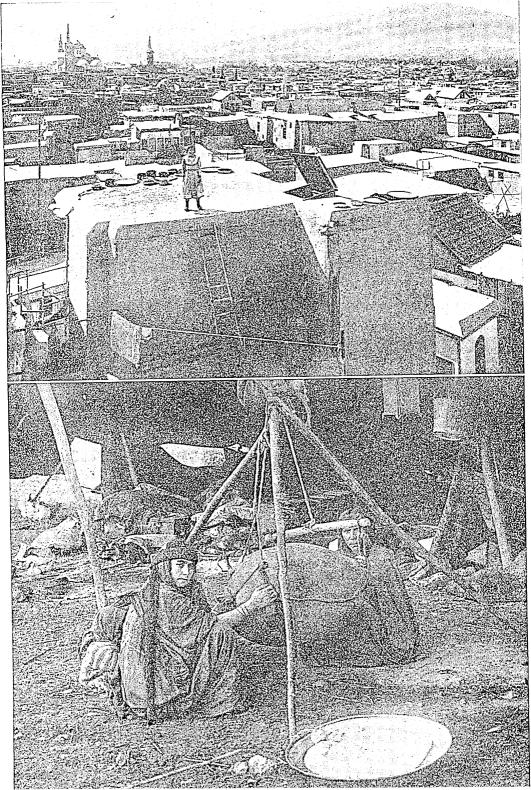
of the country is too dry for agriculture. The summers are long, hot, and dry; the winters are cold and snow is frequent.

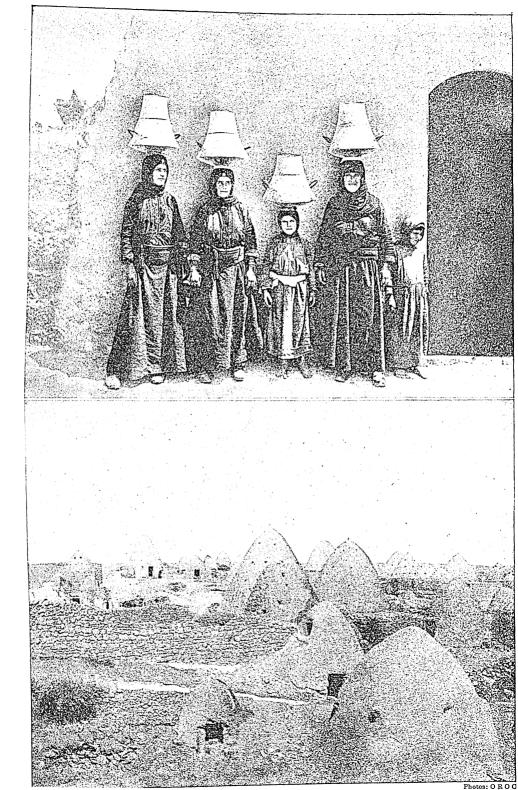
The People and Their Occupations. The people are mostly of Arabic origin, and the principal foreign elements are Turks, Turkomans, Kurds, Circassians, Armenians, Persians, Jews, and a few Europeans. Arabic is the language in general use. The majority of the population are Mohammedans; there are about 500,000 Christians and 16,000 Jews. Education is provided through public elementary schools, secondary schools, and a few private institutions. There is a Syrian University at Damascus, and American and French universities at Beirut (see below, under Beirut).

The chief occupation is agriculture, though primitive methods prevail and only about one-fifth of the cultivable area is worked. The principal products are wheat, barley, maize, olives, silk cocoons, and cotton. Cattle-breeding and sheep-raising are important. Other industries are almost negligible; some flour, oil, soap, silk thread, wine, and tobacco are produced.

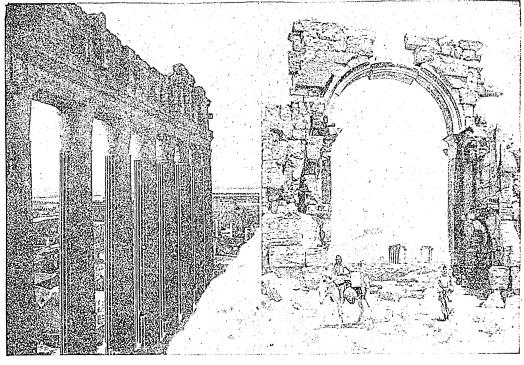
In this land, where deserts and mountains abound, travel is difficult. Railroad and carriage-road facilities are poor, but after the outbreak of World War I, the railroad system, which was controlled by the Ottoman Empire, was extended to within less than 200 miles of the Suez Canal.

History. Syria has never been a great nation, though it originally included the Holy Land, the birthplace of Christianity, and was the region in which the Israelites established themselves as a nation. Lying between two strong rival powers, it has played the part of a buffer, subject first to one great empire, then to another—Assyria, Babylonia, Persia, Macedonia under Alexander the Great, and Rome. In the seventh century A.D., it was conquered by the Arabs, and in 1099 by the Crusaders,





SYRIA



IN OLD PALMYRA

Syrian ruins in the ancient town. At left, columns of the Temple of the Sun. It will be noticed that the capitals of the columns are missing. They were of brass, and centuries ago were stolen for the metal. At right, a part of the Triumpual Arch at Palmyra.

who in turn were driven out by the Egyptians, in the twelfth century. In 1516 the Ottoman Turks conquered the country, and remained in possession until World War I, when they were expelled by the British.

Two years before World War I began, England and France made secret agreements regarding the partitioning of Syria and Palestine. In 1916 their intentions were made public in the Sykes-Picot agreement, by which Turkey in Asia was staked off into spheres of influence and assigned to the various Allies, France receiving Syria, and England being awarded Palestine. Syria was not consulted, nor were the plans of the Allies generally known there. English and French troops entered the territory in 1918, and were openly resented by the inhabitants, who had hoped to establish an independent state. When, in the conference of 1919, pleas for abandonment of the partitioning plans and the establishment of a free Syria were rebuffed, the presence of French and British troops became even more obnox-A short-lived constitutional monarchy, with Emir Faisal at the head, was set up in 1920, but continued hostilities with the French, who were determined to enforce their mandate, eventually resulted in defeat for Syria. Emir Faisal was driven out in August, 1920, and French control was established. Turkey re-

linquished sovereignty over Syria by the Treaty of Sèvres, August 10, 1920, but the treaty was never ratified. In 1922 the Council of the League of Nations sanctioned the French mandate over the area. Formal confirmation was made in the Treaty of Lausanne, 1923.

The Syrians continued to chafe under French rule, and in 1924 and 1925 several uprisings occurred. Finally, of the four territories, Lattaquié and Jebel Druze were administered by French governors. In 1930, the Syrian Republic was established with a constitution which provided for a president and a legislature. The Republic of Lebanon, founded in 1920, was forced in May, 1932, to suspend its constitution. It was restored fully on January 5, 1937. In 1936, France promised Syria independence by 1939, but did not grant it. During World War II, however, after five weeks' hostilities between France and Great Britain in 1941, the occupying Free French forces declared Syria and Lebanon independent.

The Cities. Damascus, the capital and largest city of Syria, is described under its title. Included among other important cities are the following:

Alep, or Haleb (ALEPPO), of ancient origin, is an important and historic trade center, eighty miles east of the Mediterranean Sea. Except for intervals of disputed possession, it remained a part of Turkey

until World War I. It has suffered severely from earthquake and plague, but is now a picturesque, prosperous, and fairly healthful city. Located for centuries on the principal caravan route between Asia and Europe, Alep still has an important trade in manufactured articles, which include costly silks. Again becoming a great commercial center as in



DELICATESSEN SHOP ON A DONKEY'S BACK

ancient times, it has been called "the Chicago of the Near East." There are United States and other foreign consuls here. The population is 177,317 (1935) three-fourths of whom are Moslems.

Antioche, an' tih ok, or Antakiya, ahn' tah kec' yeh, formerly ANTIOCH, on the Orontes River, was twenty miles from the Mediterranean, resting partly on a fertile plain, partly on the rugged vine-clad slopes that stretched southward. It was founded in 300 B.C. by Seleucus Nicator, who ruled over a part of the divided empire of Alexander the Great, and was named in honor of his father, Antiochus. As the capital of the Greek kings of Syria, and later under Roman rule, the city, famed for its luxury, was called "the Queen of the East." At the height of its glory, it rivaled Rome and Alexandria, having a population estimated at 400,000, and was the center of an extensive commerce. Its public buildings and pagan temples were magnificent. Under the Romans the Syrian governors resided there, and it was the Eastern headquarters of Julius Caesar, Augustus, Herod, and other rulers.

Antioche was noted as one of the chief centers of early Christianity; there the Christians first received that name (Acts XI, 26); Paul set out on his first missionary journeys from this city, and in it were held many Church councils. Its later history was troubled. After 538, when sacked by the Persians,

the proud city never recovered its former splendor. It was seized in turn by the Saracens and the Crusaders, and finally was almost entirely destroyed by the Egyptians, in 1268; at the present time, only the ruins of its walls and aqueducts remain. The site of the ancient city is occupied by the shabby town of Antakiya, an important American missionary station, with Antioch College, an institution of remown. The town has a population of 28 cos (1262).

renown. The town has a population of 28,000 (1935). Beirut, officially Beyrouth, beh' root', surpasses all cities of old Turkey in commercial and industrial growth. It is the capital of the state of Great Lebanon, and the chief seaport of Syria, and is located ninety miles northwest of Damascus, at the base of the Mountains of Lebanon. The term briar root, applied to pipes, is generally supposed to be a corruption of Beirut; the town, at one time, exported great quantities of wood suitable for pipe-making. Its chief exports now are olive oil, cereals, sesame, tobacco, and wood; its manufactures are silk and cotton, and articles of gold and silver. In ancient times, Beirut was a large and important Phoenician city, but for centuries the city was passed from ruler to ruler, until 1763, when the Turks took possession. It was taken by the British in 1840, was given to Turkey, and in 1920 became a part of the new Syria. It is the seat of bishoprics of several sects, and of a Jesuit college, as well as the American University, described below. Population, 134,655 (1935).

The American University of Beirut is a privately endowed, non-sectarian institution, chartered by the Board of Regents of the state of New York in 1863. Its departments include a preparatory school, and the schools of arts and sciences, medicine, dentistry, nursing, and pharmacy. Its student body numbers about 1,200 and the faculty about 210. It includes in its enrollment students of many nationalities—Syrians, Palestinians, Mesopotamians, Armenians, Egyptians, Persians, Greeks, Abyssinians, and a few Americans. Its purpose is to furnish cultural and scientific training to the young men and women who are to be the leaders in the professional and commercial life in the Near East.

Palmyra, pal mi' rah, a celebrated city of antiquity, situated in an oasis in the Syrian Desert, about 150 miles northeast of Damascus. Its site is now occupied by a few Arab huts, but there still remain ruins of ancient structures that tell a story of former magnificence. Among these ruins are the remains of a splendid temple to the Sun, and those of a colonnade of marble columns that extended over nearly a mile. According to tradition, Palmyra (the Tadmor of the Bible) was founded or enlarged by Solomon. In the third century A.D., when the famous Zenobia was its queen, the city was stormed and destroyed by the army of the Roman Emperor Aurelian. It was after. ward rebuilt, and as late as the fourteenth century was a prosperous trading center, but after the close of the Middle Ages, it declined into a group of hovels. See Zenobia.

Related Subjects. The reader is referred to:

Arabs Lebanon, Mountains of Bedouins Palestine
Damascus Sèvres, Treaty of Turkey
Jerusalem World War I
Jews Lausanne, Treaty of

SYRIAC, seer' ih ak, one of the two dialects of Aramaic (which see); most of the early manu-



SYRINGAS

scripts are versions of some part of the Bible. Down to the fourteenth century, the language had a vigorous life.

From the fourteenth century, however, it declined, though, to the present time, there remain in the Kurdish mountains and neighboring localities tribes who speak a language called Syriac. This differs considerably from Syriac proper. See Aramaic; Hebrew Language and Literature.

SYRINGA, sih ring' gah, the common name of a genus of flowering shrubs belonging to the saxifrage family (see SAXIFRAGE), of which the best-known species is the mock orange, or syringa, as it is also called. This plant is a hardy shrub that grows to a height of ten feet. It is valued in landscape gardening because of its showy clusters of white, delightfully fragrant flowers.

B.M.D.

Classification. It is *Philadelphus coronarius*. Syringa is also the generic name of the lilac (which see).

SYRINX, sir' inks. See BIRDS (Songs and Vocal Noises).

SYRUP, sir' up. See Maple; Sugar; Corn; Sorghum.

SYSTOLIC, sis tol' ik, PRESSURE. See BLOOD PRESSURE.

SZEGED, seg' ed. See Hungary (Principal Cities).

